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PAPERS ON COMMERCE.

An Account and Description of a TEMPORARY RUDDER, *invented by Captain William Mugford, of Salem, Massachusetts.**

Read November 16th, 1804.

THE ship Ulysses of Salem, (Massachusetts), under the command of captain William Mugford, sailed from that port on the 2d day of January 1804, bound to Marseilles. On the 5th of that month, being in latitude 41, longitude 65, from the meridian of London, she experienced a heavy gale of wind, and while running 8 and 9 knots, a large sea struck her stern and carried away the rudder at the water's edge, when the vessel immediately broached to. The main-mast was sprung and the hull lay exposed to every sea. In this unfortunate situation, captain Mugford was reduced to the necessity of steering the ship with cables over the quarters, for upwards of twenty days, making however the best of his way towards the Western Islands and Madeira. The weather during all this time was extremely bois-

* From the Transactions of the American Philosophical Society, Vol. vi. p. 203. The Society awarded to the inventor a Gold Medal, from the Extra Magellanic fund.

terous, and the ship much exposed to the sea. It was during this interval that captain Mugford planned and executed his temporary rudder. This rudder is made of a spare top-mast and other spars well lashed and secured together, and fastened to a false stern-post by eye-bolts serving as braces, and crowbars and other substitutes for pintles. The false post is also firmly secured to the old stern-post by the guys and old rudder braces which are tennoned into it, tiller ropes are fixed to each end of an old iron tiller; or for want of it, an iron anchor-stock, or a piece of scantling, or a spar is fixed across the rudder and supported with rope-braces, so that the vessel is steered in the usual manner with the wheel: and in order to keep this rudder steady in its place, while fixing it, a cannon or some other sufficient weight is fastened to the bottom of it.

Captain Mugford (after observing that great difficulty would be avoided in the construction, if the master of every vessel was in possession of the measure of the rudder and the precise distance of the gudgeons) informs us, that he found it to answer every purpose which could be expected from a temporary rudder, that his vessel was found to steer by it with the greatest ease, and that he sailed with it during fifty days, at the end of which time he arrived in safety at the port of his destination.

The drawing of the rudder, the following description of it, and the remarks subjoined, were furnished to the society by captain William Jones, one of their associates, from the model of the rudder sent by the inventor and deposited in the cabinet of the society.

MUGFORD'S TEMPORARY RUDDER.

A, (see the plate) is the main stern-post from which the original rudder has been torn.

B, Is the *false stern-post* made of a spare top-mast sided so as to fit the main stern-post, with mortices to receive the braces h h h, or the fragments thereof which remain upon the post.

C, Is the temporary rudder made of the (residue of the) top-

mast and the sprit-sail yard, studding-sail booms, or any spars that can be spared with the least inconvenience—They are cut to the proper length and partially sided and firmly bolted or *tree-nailed* together. The sides are then flatted a little with the adze, and boards nailed across and wooldings of rope bind the whole together as represented in the figure.

D D D D, Represent the spars of which the rudder is constructed.

E, Is a small spar or piece of plank fitted on each side of the false post to lead the guys clear and prevent their chafing; they are also bolted through from side to side and rivetted to secure the false post from splitting, or if bolts are not to be had, lashings are substituted as represented in the figure.

F F, Are stout flat cleats well nailed or bolted on each side of the false post under the spars E, and embrace the main post. Their use is to sustain the false post against a lateral shock.

G, Is a yoke made of an iron tiller, or other sufficient substitute, firmly fitted through the after part of the rudder near the surface of the water.

H H H, Are the temporary braces and pintles. They are formed of eye-bolts drawn out of the gun carriages or from the various parts of the hull, masts, or caps, and driven into the false post or rudder alternately, so that the eyes just meet each other; some of those in the post, below those in the rudder, and others above, in order to confine the rudder from rising. The pintles are made of crowbars, a kedge anchor-stock, or the long stout bolts out of the windlass bits.

h h h, Are the old rudder braces or the fragments thereof remaining on the post.

I, Is the profile of the stern of the ship.

K K, Are guys, the bites of which are well served and lashed to the after part of the false post, and lead separately (or combined as represented in the figure) to the fore and after parts of the main chains.

L L, Are knots worked on the guys to preserve them from chafing against the bottom and quarters.

M, Is a rope, the bite of which is lashed to the after part of the rudder below the yoke, and also to the extremities of the yoke, and from thence led through blocks attached to the end of a spar projecting over each quarter to the wheel by which the ship is steered.

N, Is a slip rope rove through a hole in the heel of the rudder, and both ends passed up through the rudder case to the head of the false post and made fast.

O, Is a grommet (travelling on the slip rope) to which a gun or kedge anchor, or any sufficient weight is attached, in order to sink the rudder until it is hung and secured.

P, Is a hauling line attached to the grommet, and by which the weight is lowered down and hauled up. When the rudder is secured in its place, the weight is removed, and the slip rope unrove.

Q, Are the rudder pendents to save the rudder in case of accident.

R, Is the lower deck.

S, Is the quarter deck.

T, Is the quarter rail.

V, The arch board of the stern.

REMARKS.

The merit of this invention is to be tested by a just comparison with the best substitute hitherto known, which is undoubtedly that of captain Pakenham's excellent invention, an account and description of which may be found in the 7th volume of the Transactions of the London Society for the encouragement of arts, manufactures, and commerce.

The difference consists in captain Mugford's new and ingenious contrivance of a *false stern post*, to which his rudder is secured by eye-bolts serving as braces, and crowbars or other substitutes as pintles, on which it works with as much ease and effect as the original rudder. The false post is also firmly secured to the main post by the guys, and the old rudder braces which are tennoned into it.

Captain Pakenham's rudder depends entirely upon the very slight hold which the cap has on the post, and does not appear to be sufficiently secured to resist a sudden lateral shock; it is, however, very simple in its construction, and requires, perhaps, less labour and fewer materials (particularly of iron) than captain Mugford's, and has the advantage of steering upon deck with a common tiller in the usual way.

Captain Mugford's rudder must work with much less friction, and consequently will require less power, as the axis on which it moves is only an inch and a half in diameter, whereas that of captain Pakenham's is the diameter of the top-mast; say 10 or 12 inches.

Upon the whole, as the construction of captain Mugford's rudder requires only the skill and materials which are usually to be found on ship board, and as it appears to be better secured, and works with more ease than captain Pakenham's, it may (without derogating from the merit of the latter) be justly considered as a valuable and useful invention.

Captain Mugford's rudder is susceptible of a very simple and important improvement, viz. If the archboard of the stern V was cut off, and the after part of the rudder case taken down, the stock of the rudder might be continued to the upper deck, and steer with the tiller in the usual way. Captain Mugford's mode of steering is exceptionable, as the yoke is at the surface of the water, and the wheel ropes leading from the yoke to the spar, broad upon the quarter; the angle which the rope makes with the yoke when the rudder is hard over, is so obtuse as greatly to diminish the effort of the power; and moreover the rudder is necessarily so broad at the surface of the water, as to expose a dangerous resistance to the action of the sea.

It is also to be observed, that few merchant ships under 350 tons burthen have either wheel or iron tiller. If the rudder was continued to the deck, the breadth might be diminished at the surface of the water and enlarged at the heel, which would increase its effect and render it less liable to injury.

In the drawing, the cleats F F, are added to the side of the

false post, and overlapping the main post, which will give it great additional security. Some minor alterations are also made, viz. In the drawing the four guys 1 1 1 1, (which are separate in the model) are combined into two K K, leading through a thimble or clinch; the reason is, that a more equal tension can be obtained of two ropes than of four, and that when combined they lead in a fairer direction under the buttock of the ship.

Indeed the number of guys are superfluous, the lower one would be amply sufficient, as the upper end of the post can be made very secure. Captain Pakenham has but a *single* guy leading from the cap on each side.

The drawing represents a mode of applying and removing the weight to sink the rudder, by which the whole can be removed with more ease when the rudder is secured.

When the rudder is fixed, the only apprehension is, the guys chafing off. There is however on board every ship a complete remedy, viz. take two of the topmast back stay chain plates and one of the bolts, and bolt them to the heel of the false stern post, one on each side; to these hook the top-blocks and mouse the hooks well; then reeve the guys through the blocks, and take both parts to the forepart of the main chains: by this means the guys may be overhauled through the blocks and examined at pleasure, keeping them always well taught and veering away one part as you haul in upon the other. These remarks are the more diffuse as the subject is considered important, and is still susceptible of great improvement.

Captain Mugford was some days before he could hang his rudder, owing to bad weather.

The man will deserve well who shall invent a simple substitute for a rudder that can be made and applied immediately *in any weather;* and it need not be despaired of, if men of ingenuity, without waiting for the calamity, would only try experiments while their ships are in a sound state.

ON THE WEEVIL IN SEA BREAD.

THE fatal effects of the Weevil in Sea Bread have long been severely felt by seamen employed on long voyages: rewards have been humanely offered by governments and patriotic societies for a cure or preventive, but hitherto without success. The following fact was discovered by accident, and is now offered to the public as a hint worthy the attention of those who may be employed in supplying ships with provisions, or to captains and the owners of vessels, and may, in all probability, lessen, if not wholly remove an inconvenience so injurious to navigation.

A bag belonging to a powder-mill fell into a cauldron of liquid nitre; it was immediately taken out, plunged into cold water, and hung up to dry. Several days after this circumstance the bag was filled with Sea Biscuit and sent on board a West-Indiaman, where it was stowed away among the captain's stock. The vessel was nine months out of England before she proceeded on her passage home, when she got becalmed and remained so long in that situation, that her crew were forced to be put on half allowance, more particularly so, as their bread was much destroyed by Weevils, and was hourly consuming. The captain at this time wishing to make use of the bag abovementioned, which had not been opened since the ship left England, ordered it to be examined, when greatly to his susprise, the whole contents were found to be perfectly sound, without any appearance of having been injured by any insect whatever: a circumstance solely to be attributed to the quality of the bag.

The editor has been informed of another plan of preserving Ship Bread having been adopted with success, which it may be useful to mention, inasmuch as the means of following it are at all times attainable in sea-ports. It is to put the Biscuit in tierces which had recently contained brandy, gin, whiskey, or rum, and heading them up tight. It is said that a vessel belonging to Connecticut, on board of which this method was adopted, brought home bread, in good condition, which had gone from the United States to China by way of the north-west coast of America.

A HUMANE HINT TO MASTERS OF VESSELS.

THE following benevolent hint was given in the public prints soon after the publication of the account of the loss of the ship mentioned. As an attention to the advice may save the lives of many, it has been deemed important to preserve it.

"Would it not be well worth the while, when at sea, to send a man, or men, aloft, several times in the course of a day—say in the morning—at noon—before dark in the afternoon, and oftener if convenient, to look round for any unhappy brother tars, who might be on a wreck, in a boat, or otherwise in distress?

"It appears by the report of the three men picked up in the Margaret's small boat,* that several vessels passed near the wreck before they left it, and the boat was so near one of them, as to see the men on her deck;—yet it must be presumed that neither of those vessels saw either the wreck or the boat. If they had adopted the regulation above suggested, is it not probable that one of them would have discovered the wreck, saved a number of good fellows, and obtained a valuable prize into the bargain?

"It is by no means intended that a master of a vessel should chase every thing which he may see, and it is allowed that he ought to be careful not to vitiate his Policy of Insurance, by cruizing for or taking prizes. Discretion should be used in this case as well as in others.

A FRIEND TO HUMANITY."

* The ship Margaret was wrecked in lat. 40. N. long. 39. 30. W. in May, 1810, on her voyage from Naples to Salem. EDITOR.

Quantity of particular articles, the produce of the United States, exported from 1800 *to* 1811.*

COTTON.

	To all parts of the world. *lbs.*	To France. *lbs.*	To England. *lbs.*
1800	17,789,803	none	16,179,513
1801	20,911,201	844,728	18,953,065
1802	27,501,075	1,907,849	23,473,925
1803	41,105,623	3,821,840	27,757,307
1804	38,118,041	5,946,848	25,770,748
1805	40,383,491	4,504,329	32,571,071
1806	57,491,282	7,082,118	24,256,457
1807	66,612,737	6,114,358	53,180,211
1808	12,064,346	2,087,450	7,992,593
1809†	53,210,225	none direct	13,365,987
1810‡	93,874,201	do.	36,171,915
1811§	62,186,000	do.	46,872,452

RICE.

	Tierces.	Tierces.	Tierces.
1800	112,056	none	77,547
1801	94,866	2,724	65,022
1802	79,822	7,186	37,393
1803	81,838	3,116	33,200
1804	78,385	6,014	24,975

* From the Address of the Minority of the Members of the Congress of the United States to their Constituents, on the subject of the War with Great-Britain.

† In 1809, in consequence of the Embargo and Non-intercourse Act, 4 million of pounds of Cotton were shipped for Madeira, 10 and a half millions to the Floridas, 6 millions to Fayal and other Azores, 1 million and three quarters to Portugal, and 10 millions to Sweden.

‡ 1810, about 4 million of pounds of Cotton were shipped for Spain, 3 millions for Portugal, 3 millions for Madeira, 10 millions for the Floridas, 2 millions for Europe generally, 4 millions for Fayal and the Azores, 14 millions for Denmark and Norway, and 5 millions for Sweden.

§ In 1811, 9 million of pounds of Cotton were shipped for Russia.

RICE.

	To all parts of the world.	To France.	To England.
	Tierces.	*Tierces.*	*Tierces.*
1805	56,830	1,601	24,737
1806	102,627	3,392	39,298
1807	94,692	3,006	37,417
1808	9,228	none direct	4,298
1809	116,907	do.	32,138
1810	131,941	do.	31,118
1811	119,356	do.	40,045

TOBACCO.

	Hhds.	Hhds.	Hhds.
1800	78,680	143	37,798
1801	103,758	5,006	55,256
1802	77,721	16,216	29,938
1803	86,291	9,815	47,829
1804	83,343	14,623	24,700
1805	71,252	12,135	18,169
1806	83,186	9,182	26,272
1807	62,232	2,876	28,047
1808	9,576	566	2,526
1809	53,921	none direct	8,965
1810	84,134	do.	24,067
1811	35,828	569	20,342

FISH, Dried or Smoked.

	Quintals.	Quintals.	Quintals.
1800	392,727	none	141,420
1801	410,948	1,687	111,030
1802	440,925	27,067	92,679
1803	461,870	3,491	71,495
1804	567,828	3,765	76,822
1805	514,549	73,004	55,676
1806	537,457	19,347	66,377
1807	473,924	87,654	55,242
1808	155,808	16,144	26,998

FISH, Dried or Smoked.

	To all parts of the world.	To France.	To England.
	Quintals.	*Quintals.*	*Quintals.*
1809	345,648	none	66,566
1810	280,804	2,150	55,456
1811	216,387	28,622	33,242

PICKLED FISH.

None exported to European France.

FLOUR.

	Bbls.	Bbls.	Bbls.
1800	653,052	none	365,739
1801	1,102,444	none	758,023
1802	1,156,248	14,628	484,886
1803	1,311,853	18,045	502,006
1804	810,008	1,074	258,515
1805	777,513	none	235,176
1806	782,724	none	308,048
1807	1,249,819	none	619,918
1808	263,813	none	73,084
1809	846,247	none	230,822
1810	798,431	none	192,477
1811	1,445,012	2,966	275,534

NAVAL STORES—TAR.

	Bbls.	Bbls.	Bbls.
1800	59,410	none	58,793
1801	67,487	none	62,632
1802	37,497	797	21,330
1803	78,989	none	75,295
1804	58,181	do.	45,210
1805	72,745	do.	59,439
1806	62,723	do.	50,663
1807	59,282	do.	51,232
1808	18,764	do.	17,700
1809	128,090	do.	33,072
1810	87,310	do.	50,021
1811	149,796	do.	123,034

TURPENTINE.

	To all parts of the world.	To France.	To England
	Bbls.	*Bbls.*	*Bbls.*
1800	33,129	none	32,586
1801	35,413	do.	35,143
1802	38,764	do.	36,769
1803	61,178	do.	60,732
1804	77,825	do.	76,950
1805	95,640	do.	94,328
1806	74,731	do.	71,854
1807	53,451	do.	52,107
1808	17,061	do.	17,009
1809	77,398	do.	22,885
1810	62,912	do.	36,995
1811	100,242	do.	97,250

LUMBER.

Of the vast quantities of Lumber exported from 1800 to 1811, only a few Staves and Heading went to France, as follows, viz.

	Thousands of Staves and Heading.
1801	6,349
1803	357
1804	321
1805	466
1806	716
1807	614
1808	105

PAPERS ON MANUFACTURES.

ON THE MANUFACTURE OF VITRIOLIC ACID.

Communicated by THOMAS COOPER, *Esq.*
Professor of Chymistry in Dickinson College, Carlisle.

THE process in the large way for making Vitriolic Acid is as follows. Set up the frame of a room 20 feet by 30 feet, and 18 feet high. Of this room, the sides and the ceiling should be lined with milled lead, about 6 lb. to the foot. The bottom should be of lead 8 lb. to the foot, with a plug to let off the liquor close. Two feet six inches from the bottom, on the 20 foot side, should be, at equal distances from the sides and from each other, two trap doors eighteen inches square, that move up and down in a groove by means of a pulley. Opposite to each of these trap doors should be an iron frame about a foot wide in the clear, and set on leaden feet, or lumps of lead, four inches at least from the bottom of the room. Each of these frames are destined to hold three or four stone ware, or porcelain pans, 15 inches diameter, and 4 inches deep, which are to be half filled with brimstone and saltpetre, ground together and sifted, in the proportion of 8-9ths of brimstone and 1-9th of saltpetre. Fix the pans on the frames or tressels, light the mixture by a redhot iron, shut the trap doors, and let them burn. The nitre supplies oxygen to the sulphur, which is converted into volatile vitriolic acid. If water could be admitted on the top, and outside of the room, the condensation would be assisted. Much volatile nitrous acid is also disengaged by the action of the new-formed vitriolic acid on the saltpetre, which may occasionally be let out by a trap door on pulleys, towards the top of the further side of the room. When the pans of the mixture are extinguished, leave the room close for an hour before you take them out; then empty, fill, and light them again. After three burnings, a jet of cold water may

be thrown in by a hand pump, so as to extend in a scattered rain-like stream, through the room. Then open the trap doors and admit a current of air. Do not throw in too much cold water, as it will require more fuel. Draw off the contents at the bottom, and evaporate for two hours by a strong fire, in leaden retorts, or pans; then finish in large glass retorts in a sand bath. In England, the glass retorts, hold 90 lb. of oil of vitriol, when concentrated, which is one half too much, for unless the men are very careful, they are apt to break them. In Scotland they concentrate entirely in lead. Oil of Vitriol should weigh 29 1-2 oz. to the wine pint, measured and weighed in a Florence flask. According to the late experiments of Mr. Chevenix, Vitriolic Acid consists of 61.5 of sulphur, and 38-95 oxygen to 100 parts of acid. If the Oil of Vitriol be black, a tea-spoonful of nitre will clear it. The residue of the pans may be ground with the brimstone and burnt again. The pans would be better if they ran upon small inch wheels in a groove in the frame, and were drawn out by a crooked iron.

ON GOLD LEAF.

GOLDBEATER'S SKIN. SILVER LEAF. DUTCH GOLD.

DR. LEWIS, in his "*Commercium Philosophico-Technicum*,* first gave the public an account of the process adopted by artists in making Gold-Leaf, which has been copied by all writers since his time. But Mr. Nicholson, of London, whose authority upon all subjects connected with the arts is very great, because he goes to the fountain head for information, says† that Lewis's assertion of the high state of purity of the metal in Gold-Leaf is a mistake.

"It is," says he, "never pure, because pure gold is too ductile to be worked between the goldbeater's skin. The newest skins will work the finest gold, and make the thinest leaf, because they are the smoothest. Old skins, being rough or foul, require

* London 1763. † Philosophical Journal, Vol. I, 4to.

coarser gold. The finer the gold, the more ductile: insomuch that pure gold, when driven out by the hammer, is too soft to force itself over the irregularities, but would pass round them, and by that means become divided into narrow slips. The finest gold for this purpose has three grains of alloy in the ounce; and the coarsest twelve grains. In general the alloy is six grains, or one-eightieth part. That which is called pale gold, contains three pennyweights of silver in the ounce. The alloy of leaf gold is silver or copper, or both, and the colour is produced by various tints accordingly. Two ounces and two pennyweights of gold are delivered by the master to the workman, who, if extraordinarily skilful, returns two thousand leaves, or eighty books of gold, together with one ounce and six pennyweights of waste cuttings. Hence one book weighs 4.8 grains, and as the leaves measure 3.3 inches in the side, the thickness of the leaf is one two hundred and eighty-two thousandth part of an inch."

The gold is beat on a smooth block of black marble, from two hundred to six hundred pounds in weight, and about nine inches square on the upper surface, fitted into the middle of the wooden frame, about two feet square, so as that the surface of the marble and frame form one even plane. Three of the sides are furnished with a high ledge, and the front, which is open, has a leather flap fastened to it, which the goldbeater uses as an apron, for preserving the fragments of gold that fall off. Three hammers are employed in this business, having two round and somewhat convex faces: the first, called the cutch hammer, is about four inches in diameter, and weighs fifteen or sixteen pounds: the second, called the shodering hammer, weighs about twelve pounds, and is about the same diameter: the third, called the gold or finishing hammer, weighs ten or eleven pounds, and is nearly of the same width. The French use four hammers, differing both in size and shape from those of our workmen.

The goldbeaters also use three kind of animal membranes; some of which are laid between the leaves to prevent their uniting together, and others over them to defend them from injury by the action of the hammer. For the outside cover, they use

common parchment made of sheep-skin; for interlaying with the gold, first, the smoothest and closest vellum made of calves' skin; and afterwards, the much finer skins of ox-gut, stript off from the large straight gut slit open, prepared on purpose for this use, and hence called *goldbeater's skin.* The general process of their preparation, is said to consist in applying one upon another, by the smooth sides, in a moist state, in which they readily cohere and unite inseparably, stretching them on a frame, and carefully scraping off the fat and rough matter, so as to leave only the fine exterior membrane of the gut, beating them between double leaves of paper, to force out the remaining unctuosity; moistening them once or twice with an infusion of warm spices, and lastly, drying and pressing them. It is said, that some calcined gypsum, or plaster of Paris, is rubbed with a hare's foot, both on the vellum, and ox-gut skins, which fill up their pores, and prevent the Gold-Leaf from sticking. These skins, after seventy or eighty repetitions, become unfit for use; but their virtue may be restored by interlaying them with leaves of paper moistened with vinegar or white wine, beating them for a whole day, and afterwards rubbing them over with plaster of Paris: and even holes in them may be repaired by the dexterous application of fresh skins.

The manner of preparing and beating gold. They first melt a quantity of gold and alloy, in a black-lead crucible, with some borax, in a wind furnace, and pour it into an iron ingot mould, six or eight inches long, and 3-4ths of an inch wide, previously greased and heated; the bar of gold is made redhot and forged on an anvil into a long plate, which is farther extended, by being passed repeatedly between polished steel rollers, till it becomes a ribband, as thin as paper. This ribband is divided by compasses, and cut with shears into equal pieces, which are forged on an anvil till they are an inch square, and afterwards well annealed. Two ounces of gold, which is the quantity melted at a time, make a hundred and fifty of these squares, so that each of them weighs six grains and two fifths; and as 4902 grains of gold make a cubic inch, the thickness of the square pieces is

about the 766th part of an inch. All these squares are interlaid with leaves or vellum, three or four inches square; one leaf being laid between every two of them, and about twenty more of the leaves are laid on the outsides; over these is drawn a parchment case open at both ends, and over this another, in a contrary direction, so that the vellum and gold leaves are kept tight and close. The whole is then beaten with the heaviest hammer, till the gold is stretched to the extent of the vellum: the pieces taken out of this case or mould, are cut in four with a steel knife; and the six hundred pieces thus produced are interlaid in the same manner, with pieces of the ox-gut skins, five inches square. The beating is repeated with a lighter hammer, till the golden plates have acquired the extent of the skin; when they are divided into four by a piece of cane cut to an edge. The whole number of leaves is then divided into four parcels, which are interlaid, as before, and beaten separately, till they are stretched for the third time to the size of the skins. The French repeat the division and beating once more. After the last beating, the leaves are taken up by the end of a cane instrument, and being thrown flat on a leather cushion, are cut to a size, one by one, with a square frame of cane made of a proper sharpness, or with a frame of wood edged with cane. They are then fitted into books of twenty-five leaves each, the paper of which is well smoothed, and rubbed with red bole to prevent their sticking to it. The size of the French gold leaves is from somewhat less than three inches to 3 3-4 square; that of the English from three inches to 3 3-8.

Silver-Leaf is said to be pure silver. It is extensible in this way when compared with gold, rather more than in the proportion of their specific gravities. Some leaf silver which Mr. Nicholson tried, was thicker than the gold in the proportion of seven to four. So that the weight of metal covering equal surfaces approached to equality.

The *Yellow Metal* called *Dutch Gold*, is made from copper-plates by cementation with calamine, without subsequent fusion. Its thickness, compared with that of leaf gold, proved as nine-

teen to four, and under equal surfaces it is considerably more than twice as heavy as the gold.* By another authority it is stated to be "only copper leaf coloured by the fumes of zinc."†

The consumption of this article is immense. Twenty tons of it have been sent at a time from England to Surat and to the other parts of the peninsula of India, for the dresses of the females of the country, their priests and gods.‡ It is also used for inferior binding, for coarse gilding by painters, dolls for children, theatrical dresses, and as a substitute for real gold leaf on many other occasions. Zinc abounds in the United States, and even so near Philadelphia as Perkiomen, but before this manufactory can be introduced, the business of rolling copper must be set on foot. At present Dutch Metal is manufactured chiefly in Holland and Germany.

GENERAL VIEW
OF THE
MANUFACTURES OF THE UNITED STATES.

DURING the last session of Congress, Dr. Mitchell, member of the House of Representatives from New-York, was requested by the Committee of Commerce and Manufactures to examine the returns made by the marshals, on the state of the manufactures, and agricultural products of the United States, while they were taking the census of the people during the year 1810. The reports were accordingly submitted to him, and he undertook the task of making a general abstract; and of deducing a sort of comprehensive table. But the returns of many of the States were incomplete, particularly that from South Carolina, a circumstance that rendered it impossible to arrange the

* Nicholson's Philosophical Journal, Vol. I, 4to.

† Imison's Elements of Science, Vol. II, p. 526.

‡ Tradesman, April 1809, p. 313.

materials into one compendious view. He notices the returns from Massachusetts and Pennsylvania, as being examples of order, perspicuity, and research. The following are the principal facts afforded by an examination of the returns.

New-York gave 867 tanneries, 491 distilleries, 42 breweries, 33,068 looms, 467 fulling mills, 413 carding machines, 20 cotton manufactories, 28 paper mills, 124 hatteries, 6 glass houses, 2 powder mills, 18 rope-walks, 10 sugar refineries, 28 oil mills, 11 blast furnaces, 10 air furnaces, 44 cut nail manufactories, 48 forges, besides cloths.

Ivory, Horn, and Tortoise-shell—Massachusetts, annual value, $ 80,624—Connecticut, do. $ 70,000—Pennsylvania, $ 6,240—equalling a sum of $ 156,864.

Copperas—W. Tennessee, 56,000 lbs.—Vermont, 8000 lbs.

Ardent Spirits, including Rye Whiskey, Rum, Apple and Peach Brandy—3,720,000 gallons.

Water and Horse Mills employed in spinning cotton in August 1810, 330, working 100,000 spindles; these on an average will spin annually between four and five million pounds of yarn, and that yarn would be sufficient to weave 18 million yards of cotton cloth, 3-4th of a yard wide: and this is independent of domestic spinning.

Fulling Mills, 1630.

Wool-Carding Machinery going by water, 1585.

Looms, 330,000, and the total number of yards of cloth, made of wool, cotton, and flax, as returned, exceeds 75 millions.

Gunpowder Mills, 207, and prepare yearly 1,450,000 lbs. of powder.

Forges, Furnaces, and Bloomeries, 530.

Paper Mills, 190.*

Sheep—Vermont, returned 450,000—Massachusetts, 399,182—Connecticut, 400,000—Pennsylvania, 1,469,918.

* Of these, 76 are in the States of Delaware and Pennsylvania, and work 93 vats, according to the report at a general meeting of the trade in Philadelphia, in 1811. EDITOR.

Salt Petre—Virginia prepares annually 59,175 lbs.—Kentucky 201,937—Massachusetts, 23,600—East Tennesse, 17,531—West Tennessee, 144,895—making nearly half a million pounds of home-made nitre, as good as that brought from foreign parts.

Straw Bonnets—Massachusetts, yearly value, $ 551,988—Connecticut, $ 27,100.

Maple Sugar—Ohio, annual produce, 3,023,806 lbs.—Kentucky, 2,471,647—Vermont, 1,200,000—East Tennessee, 162,340 lb.

The number of looms, and of carding and spinning machines almost exceeds belief, as does also the amount of cloth prepared by the inhabitants. The woollen manufacture has prodigiously increased, as well in the quality and variety, as in the quantity of the goods. Such advances are already made toward supplying domestic fabrics enough to clothe the people, that but a few years more will be necessary, under the existing commercial restrictions, to effect that important object.

The fabrics of flax are also far extended, and so much on the increase, as to excite the most cheering prospects of an augmented supply to our citizens from their own proper labour and skill. The superior excellence of homespun linen is the strongest of all recommendations. Thus far Dr. Mitchell.

To the above statement may be added a particular account of the cotton mills in three states, all within 30 miles of the town of New-Providence, Rhode-Island. Thirty-eight factories, contain 30,663 spindles, but 53,246 might run in the building. In Massachusetts, 30 factories contain 17,371 spindles, but 43,458 might run—In Connecticut 76 factories contain 51,454 spindles, but have room and power enough for 111,600 spindles.

Finally, the rapid multiplication of sheep in the United States, the increased cultivation of the fuller's teazle, the improving state of our knowledge in the art of dyeing, and the discovery of inexhaustible beds of the invaluable fuller's earth, the great increase of the wire-drawing business,* and the expeditious mode

* Iron wire is now drawn in Connecticut; at Burlington, Vermont; at Philadelphia, and Pittsburgh, and will be shortly commenced by the "Wire Company," incorporated by the State of New-York.

of making cards by Whittemore's plan, are all sureties for the successful prosecution of the woollen manufacture in the United States.

Had the returns of the marshals on the manufactures and agricultural stock of the United States, which was made in pursuance of the third census law, and sent last year to government, been published at length, facts would have been brought to light, of which a large portion of our citizens have no idea. The friends to the prosperity and independence of their country will rejoice to hear, that a complete report on this interesting subject is making out by a gentleman,* whose attention has been officially drawn to the resources of the United States for some years past.

It is worthy of notice, that although in the New-England States, and in New-York, there are numerous establishments for the manufacture of woollen cloth, and that in Pennsylvania there are none except for coarse woollens, and these on a small scale, yet, that this state contains so many more sheep than any other noticed in the report, and it is believed than any other state in the Union. As not a pound of wool has ever been exported from Philadelphia, the conclusion is, that the whole of the wool produced by the 1,469,918 sheep, must have been worked up. Wool-carding machines are erected on almost every stream in the state, and at these the wool is made into rolls, which are spun in the families of the farmers. Weavers and fullers also abound, who weave, dress, and dye the cloth. The average produce of each sheep may be fairly estimated at three lbs. of washed clean wool, at the lowest computation, fit for carding or combing; and giving the result of 4,409,754 lbs. of wool, according to the returns of sheep. From this circumstance, an opinion of the extent of the domestic manufactures of the State may be formed. The returns are, however, inaccurate, for in the blanks accompanying the letter of instructions to the marshal's deputies, no notice was taken of the invaluable new Leicester or Bakewell sheep, which, happily for the country, are rapidly spreading

* Tench Coxe, Esq. late Purveyor of Public Supplies.

through the States of New Jersey, Pennsylvania, and New-York. These sheep, from their beautiful forms, take on fat very speedily and carry wool of a good quality, some of which will comb well, and will make excellent blankets and worsted: the shorter staple make cloths of a second quality in England.

ACCOUNT OF IMPROVEMENTS IN THE MECHANICAL ARTS.*

Turkish, or Oriental Paste.

THE jewellers of Paris have of late years formed many handsome ornaments, such as ear-rings, bracelets, broaches, made of a kind of stone or perfumed paste. On the examination of this mock jewellery, it has been found to be made from the *Japan earth*, known by the name of *mimosa catechu*, an article well known in the *materia medica*, and being mixed with musk or ambergris to render it perfumed, and diluted with gum dragant, it is rendered into the requisite form by proper moulds, according to the following process:

They first take the requisite quantity of *cachou*, reduced into small bits, on this is then poured eight times its weight in equal quantities of strong vinegar and rose water; this mixture is then put into a glass bottle stopped with a piece of moistened bladder, pierced with a pin-hole to give access to the air, it is then placed in a sand bath, or on a stove moderately heated, until the cachou is dissolved.

Thus dissolved it is suffered to grow cool, and then filtered through gray paper; it is then put into a retort, to which is attached a recipient. The whole of the spirit is then distilled, until it emits nothing but clear water.

The residue at the bottom of the retort is then put into a china bowl, and to every ounce of dissolved cachou is then added half

* From the French Archives of Inventions and Discoveries for 1810, and Bulletin des Neusten aus der Naturwissenschafft of Hermbstadt. Translated for the Tradesman, July, 1810.

a drachm of the solution of gum dragant, and the whole is mixed up into a thick paste, which congeals in the cold. Whilst the paste remains ductile, there is added the quantity of from four to six grains well pulverized, to the quantity of every half ounce, and the whole is to be well mixed up together.

This preparation of the paste is then put into the requisite shaped moulds made of either copper or brass, and the inside of which must be well polished, and anointed with oil of almonds or jessamine, to prevent the paste from adhering thereto. It is then covered over and left to harden gradually.

In this manner are made every requisite fancy ornament, and to which can be given a variety of odours, such as roses, cinnamon, bergamot, &c. &c.

Turkish Pearls.

These are much used by the jewellers abroad in various ornaments, and being perfectly *black*, form a beautiful relief to the common pearl or composition, as well as to ornaments of gold and silver. These are also composed of *cachou* or *terra Japonica*, as beforementioned, by the following preparation.

Two ounces of pulverized cachou is dissolved in eight ounces of rose water, of a gentle heat, which is then filtered through a linen cloth; after which the liquor is evaporated until the residue is reduced to about three ounces. To this is mixed half an ounce of *iris of Florence* in powder, with twelve grains of musk and twenty drops of oil of bergamot or lavender, the whole being well mixed together. After this, two drachms of pulverized isinglass is dissolved in a sufficient quantity of water over a slow fire, adding thereto two drachms of lamp black, which is then mixed with the former composition, so as to form a black paste of a strong consistence. To form the pearls of an equal and uniform shape and size, the same machine can be employed as is used in forming medicine pills; when this is done, they are simply pierced by a needle dipped in oil of almonds, and immerged in the same kind of oil or any other, to give them the requisite odour, and are left to dry gradually.

The colour of these pearls as well as the scent can be varied according to fancy, by using different colouring articles.

These kind of pearls form a considerable traffic, in the various trinkets and ornaments on the continent.

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The following methods of obtaining colours for dyeing are extracted from the *Journale fur Technologie*, par M. Juch; and from the Journal Hollandois, par M. Tiboel, under the title of *Scheikundige Mengelstoffen:*

To make a Vegetable Blue.

Gather a sufficient quantity of the common field *blue bottles* of the deepest colour, together with the cup of the flowers, which are to be dried a little upon a stove of a moderate heat. The flowers in this state (half dried) are to be steeped with gum-arabic water, and the whole kneaded together; this paste is then to be placed between paper, and strongly compressed between boards. They are left in this state some days, when it is bruised in a stone mortar, adding thereto a small quantity of allum dissolved in water. It is then filtered, and the liquor thus filtered, is evaporated in a china vessel, and the residue at the bottom thereof is the finest vegetable blue.*

* The following receipt to dye *a never-failing blue*, has been recently published: of its merits the editor knows nothing.

Take one pound of logwood, boil it in an iron pot four hours, in as much water as will cover three pounds of flaxen yarn when boiled; then put in your thread and let it remain a few minutes, take it out and add two ounces of blue vitriol, finely powdered, stir it well for two minutes, put in your yarn again, and keep it in two minutes, stirring it all the time; then take it out and put it in clean cold water, in which let it remain two minutes more, then take it out and dry it, after which boil it well in strong soap suds. Cotton and wool may be dyed in the same way, but will not bear boiling in suds more than milk warm.

To make a fine Green.

Pulverize in a mortar equal quantities of verdigris and cream of tartar, to which add eight times its quantity of water; let it remain thus for eight days in a bottle, kept in a moderate heat. This solution is then to be filtered, adding thereto an eighth part of the weight of the verdigris of gum-arabic, keeping it over a gentle stove heat until the gum is dissolved; from this will be obtained a fine green, which will be rendered more clear and deep according to the degree of evaporation.

The process of making PRUSSIAN BLUE *with facts and observations on the theory. By the late* JOHN PENNINGTON, *M. D.*

FEW facts have engaged the attention of chymists more than the theory and preparation of this wonderful paint; it indeed presents us with what is called a *chymical miracle*, that is, two colourless transparent fluids, immediately after mixture, assuming a dark blue colour.

But, before we enter into the theory of the operation, let us attentively consider the process itself, and lay down what we suppose the most economical method of making it. It consists in heating a mixture of certain animal substances, as dried ox blood, bones, horns, and some others, with a fixed alkali [potash] in the manner hereafter described.

It has been found, that almost *any animal* substance may be used for this purpose; but, for a variety of reasons, I would prefer *bones:* they can be procured more conveniently; they require no previous boiling to render them solid, as blood does; and they contain more useful matter in a smaller bulk, which a manufacturer will find to be of no small importance.

One of the chief advantages of a chymical manufactory is, that *nothing is lost.* To procure spirits of hartshorn for medicinal purposes, *bones* are distilled; the bones, after this process, provided they are *black*, are as fit, or perhaps even better, for the

preparation of Prussian blue, than *ox blood*, or even bones themselves, in their fresh state: they are more pulverable, and consequently more easy to be combined with any other substance. They are, in this state, to be procured at a very low price, perhaps for the trouble of hauling them away, as several hundred cart-loads have been thrown away, within a year, near the city of Philadelphia.

I believe that any of our readers, who shall be inclined to make this article, will find the following the *cheapest* and most easy process, and which I can recommend from many actual experiments.

Take six pounds of powdered *black bones;* mix them well with one pound of potash; press them closely into an iron pot, which ought to be covered with an iron cover, well plaistered with clay or earth: let the whole be exposed to a *bright red heat*, during the space of three or four hours. After suffering it to cool, it should be taken out, all its soluble parts dissolved in hot water, and made clear by straining through flannel. If we would wish the blue to be of the very best quality (in which case the quantity will be proportionably less) we pour into this liquor *spirit of salt*, or *oil of vitriol*, until we observe no more boiling, or hissing noise, on the fresh addition of it: we then pour the whole into a solution of only half a pound of green vitriol in two gallons of water. If we wish to have a *lighter blue*, we add a less quantity of the spirit of salt, or oil of vitriol, to the liquor from the bones, in which case we add a quarter of a pound of alum to the solution of the green vitriol; we then mix a little of the two liquors in a phial, and if the colour is too light, we add more of the spirit; if it is to our mind, we mix the whole together as before. In the instant of mixture, the two liquors, which were before *colourless* and transparent, become of an opake blue, darker or lighter, according as the first or second direction has been followed; in a few hours the blue *fecula* subsides, and leaves a transparent liquor on the top, which may be thrown away: the sediment must be stirred up with clean hot water, and then suffered again to subside: this must be re-

peated seven or eight times, and then be filtered through paper and dried on a large cake of chalk. The other part of the process is so *mechanical*, that I am certain it will occur to any experimentalist who shall ever undertake it.

I shall now only hint at some advantages which may be obtained from a manufactory of Prussian blue, in *large quantities*. Bones may be ground with no trouble, and very little expense to the workman, by those who grind the plaster of Paris: large iron pots might be used, and a number of them filling and being filled whilst one or more was calcining in the furnace, a fresh one might be put into it as soon as the other was done, without suffering the fire to go out.

Mr. Macquer, who made many valuable experiments upon this subject, has found that a double elective attraction takes place between the *ley* drawn from the bones, the pot-ash, and the *green vitriol;* and that whilst the alkali tends to unite with the * vitriolic acid of the green vitriol, *a something* united to the ley or alkali, at the same time leaves the alkali, and unites with the earth of iron contained in the green vitriol, which two last ingredients are the proximate or immediate constituent parts of Prussian blue: this something, whatever it may be, certainly gives the colour to the earth of iron, and this he modestly calls the *colouring matter of Prussian blue*, and, from theoretical principles, he supposed this was phlogiston; hence he afterwards called the alkali thus impregnated, the phlogisticated alkali; to this hypothesis, the same ingenious author who framed it, raised some striking objections, but not sufficient in his opinion to overturn it, and having none better to offer, he was inclined to support it.

He extended his experiments still further; he proved that vegetable alkali, boiled with Prussian blue, was able to *attract* the colouring matter from it, and thus to decompose it, making an artificial *phlogisticated* alkali; whilst the calx or earth of iron,

* We will just repeat here, that copperas (also called green vitriol) is a compound of vitriolic acid and iron.

in the Prussian blue, remained like *rust* in the vessel; by adding to this new mixture some green vitriol, he was able to *regenerate* a very pure Prussian blue, upon the same principles as already explained.

We are told, by Mr. Fourcroy, that a Mr. Sage presented a memoir to a certain literary society, on the phlogisticated alkali, in which he supposes it consists of a fixed alkali and *phosphoric acid:* before we proceed further, I will just mention that many animal substances contain a certain acid, which, treated in a particular manner, yields a substance capable of burning when only exposed to the air, and this is called phosphorus, and the acid capable of yielding it, is properly enough called phosphoric acid. But Mr. Sage is not altogether accurate in his remarks on this subject; we have now in this city such a salt, consisting of a fixed alkali and this acid, called *soda phosphorata;* but a solution of this salt, added to a solution of green vitriol, will not yield a *blue*, but a *white* colour; and we conclude, with the abovementioned author, that his theory cannot be admitted.

Messrs. Bergman and Scheele, in a variety of most beautiful experiments, to which I refer the curious reader, have proved that this colouring matter is an *acid*, and consequently that the *phlogisticated* alkali is a neutral salt, consisting of a fixed alkali and the acid which he with great propriety calls the acid of Prussian blue. Mr. Bergman conjectures that the acid is composed of aerial acid, (fixed air) volatile alkali, and phlogiston: but I shall venture to offer my doubts on this head.

In the preparation of Prussian blue, we find that every substance, containing *phosphoric acid* and volatile alkali, and is capable of burning, or (as a theorist would express it) that contains phlogiston, are proper for the purpose. I have not been able to find any *animal* matter that had not the first and last substances in its composition, that could be made to yield Prussian blue, and experiments seem to show that the *volatile alkali* is *not* essential to success. *Ox bile*, according to Fourcroy, distilled in Woulfe's apparatus, yields *concrete volatile alkali* (the salt formed by aerial acid and pure volatile alkali) and inflammable air

(the phlogiston of Bergman) with a considerable quantity of uncombined aerial acid, which Fourcroy always calls *cretaceous* acid. Here then we find all the principles which Bergman supposes to be necessary to make his *Prussian acid*, but I believe every chymist will fall short of success, if he substitutes *ox bile* for dried blood, &c. in his process for making Prussian blue. I have twice attempted it, but in vain: and in further confirmation of the uncertainty of this method, we remark, that if ox bile is dried first, and treated in the way that is necessary to obtain phosphoric acid from other animal matters which yield it, yet it will not afford one particle of it.

THE following account is extracted from the *Journal de Physique:*

"Any quantity of horns and hoofs is to be mixed with an equal weight of chippings of leather, and the whole submitted to distillation in a large iron retort, fixed in a reverberatory furnace; the oil and impure ammonia, resulting from this process, are collected in a receiver, and the distillation is carried on at a high heat, till no fluid or vapours of any kind come over—the oil and alkali are disposed of to different manufacturers, and the black spongy coal remaining in the retort is the only part made use of in the preparation of the Prussian blue.

Ten pounds of this coal, and thirty pounds of common potash, are reduced together to a coarse powder, and heated to redness in an iron pot; by degrees the mass is brought into a state of semifusion, in which it is suffered to continue twelve hours, when the matter gives out a strong odour of sulphur; it is then taken out red hot, and thrown into a boiler of water, where it undergoes ebullition for about half an hour. The clear liquor is separated by filtration, and the residue is boiled in fresh parcels of water, till all the saline matter is extracted. These different lixiviums are then mixed together. Four pounds of alum, and one

and a half of green vitriol, are dissolved in warm water, and this solution is added to the former: a copious whitish precipitate is immediately deposited, which being collected and washed, acquires, by an exposure to the air, a beautiful blue colour."

A method, differing in some small degree from the above, is practised in some of the manufactories.

Six pounds of clippings of leather, six pounds of hoofs and horns, and ten pounds of common potash, are boiled together in an iron pot to dryness; the residue is then mixed with two pounds of crude tartar, and by means of a strong fire, brought into fusion. The lixiviation is conducted in the usual way, and a solution of five pounds of green vitriol, and fifteen of alum being added, a precipitate takes place, which is the Prussian blue.

REMARKS.

The foregoing essay by Dr. Pennington, is taken from a volume now very scarce, of "*Chemical and Economical Essays*," published in the year 1790 in Philadelphia, while the author was a student of medicine; and whose death, which took place in 1793, will never cease to be a source of regret to those who knew his chemical talents, his industry, and the useful bent of his pursuits. The foregoing paper is the result of numerous laborious experiments, and has therefore a strong claim to the attention of the manufacturer of the article of which it treats.

The Editor, anxious to discover whether any improvement had been made on the manufacture since the publication of Dr. P.'s essay, consulted Aikin's Chemical Dictionary; but was surprised to find, that after giving the process as first published by Macquer, says that "This with some variations in the proportions of the ingredients and in the exact manipulation, is said to be the usual way of preparing this pigment in manufacture, and will always succeed to a certain degree. Nevertheless several chemists who have exactly followed it in the large way, for the purpose of sale, have been disappointed in the quantity yielded, and have not always succeeded in the quality of the article, so that

it is probable that there are some particulars in the manipulation, &c. which are only known to the manufacturers."

Mr. Nicholson, who is usually so particular in his notices of the arts, is even less instructive on the subject. See his Chemical Dictionary.

ON MAKING EARTHEN-WARE.

(From Parkes's Chemical Catechism.)

EARTHEN-WARE, according to the Old Testament, was known at an early period to the Jews; and the potter's wheel, there spoken of, was probably the same simple machine as is used at the present day to form round vessels with plain surfaces. The making of porcelain has long been known in China and Japan; but it was accidentally discovered in Europe by a chemist, in the beginning of the 18th century. It was so esteemed by the Romans, that, after the taking of Alexandria, a porcelain vessel was the only part of the spoil retained by Augustus. Dr. Thomson, vol. ii. 286.

For making pottery, or earthen-ware, the clay is beaten in water; by which the fine parts are suspended in the fluid, while the coarser sink to the bottom of the vessel. The thick liquid is further purified by passing it through hair and lawn sieves of different degrees of fineness; and is afterwards mixed with another liquor of about the same density, consisting of ground flints. This was the composition of the white stone ware, about 40 years ago the staple manufacture of the potteries of this kingdom; and it is also that of the finer earthen-wares at present in use, though in different proportions; and with various improvments, introduced by the ingenuity of succeeding manufacturers. This mixture is then dried in a kiln, and after being beaten to a proper consistence, becomes fit for being formed by the workman into dishes, plates, bowls, &c. The fine white and cream-colour earthen-wares now made in England are fired twice: the first time to give them the requisite hardness; and in that state they are called *biscuit*: they are then dipped in a vitreous composition, and being sub-

jected to a second burning, acquire a coating of true glass, thence called a *glaze*. If they are finished with painting in enamel, it is necessary to pass them a third time through the fire. One of the ingredients of this glass being oxide of lead, the workman, whose hands are constantly immersing in the mixture, is subject to *paralysis*, unless due precaution be taken. To prevent it, the manufacturers have of late years assigned to such men a varied employment about their ovens, and furnish them with a dress to wear at the glazing tub, and throw off when they leave it, and a water cistern, soap, and towels near them, that they may be more certain, when employed in the glazing, to wash their hands before they go to their meals. It is feared, however, that an unhappy opinion of the efficacy of spirituous liquors does more mischief to this class of workmen than any other circumstance; for, attributing to the effect of lead whatever slight disorder occurs, they have recourse, in the first instance, to them as specifics, in such cases, and thus acquire the habit of an immoderate use of what probably affords them a temporary relief, but does not fail to produce a permanent and destructive disease. This is, I believe, the sole opprobrium which falls upon the potter's art, yet even this may be greatly diminished, if not entirely removed, by the precautions above mentioned: however, as it is desirable to preclude the use of lead altogether, the Society for the Promotion of the Arts has offered a premium for a substitute for this glaze, or for a mode of using it which would not subject the men to these dangers.

The white and the brown stone wares are passed only once through the fire, for at a certain period of the heat they are made to undergo a partial vitrification at the surface, by the fumes of muriate of soda; this salt being thrown into the oven, and the pieces of ware so disposed as to receive the fumes of it on every part of their surfaces. This method of glazing earthen-ware with salt was introduced into England by two brothers from Holland, of the name of Elers, about the year 1700. They settled in the neighbourhood of the Staffordshire potteries; and it is remarkable, that the alarm occasioned by the fumes which spread over the country obliged them to leave it. The son of one of these artists

was afterwards an active magistrate of the county of Oxford; and *his* son is at present a very respectable English barrister. A similar manufactory was however soon after established, at Shelton, in the potteries, by one of their workmen, named Astbury, who had possessed himself of their secret; and as it became of great utility, it was readily tolerated by the inhabitants, and at length, on the common day of glazing, (Saturday,) the thick offensive fumes from fifty to sixty manufactories filled the valleys, and covered the hills of a district of country, extending many miles.

There is no doubt that the potteries had been established in this part of Staffordshire, which abounds with coal, for many centuries: at some depth indeed below the surface strong indications have been found of the site of Roman potteries; but down to the epoch I have been speaking of, the productions and the condition of the potters were in much the same rude state as when Plot made his survey of the county.

The Messrs. Elers had also the merit of introducing into this country a red unglazed porcelain, which they made from a clay found in the estate they had settled upon in Staffordshire, called Bradwall; but it was only the brown stone ware, (of the same kind as that now made by the Lambeth potters,) in the composition of which no flint is used, which they glazed in the manner above described. The white stone ware, and the use of ground flints in the pottery, were discoveries of later years; and owe their origin to the following curious incident:—About the year 1720 a potter (believed to be the Astbury above mentioned) travelling to London on horseback, had occasion, at Dunstable, to seek a remedy for a disorder in his horse's eyes; and the ostler of the inn, by burning a flint stone reduced it to a fine powder, which he blew into them. The potter, observing the beautiful white colour of the flint after calcination, instantly conceived the uses to which it might be applied in his art; and then introducing into use the white pipe-clays found in the north side of Devonshire, instead of the irony clays of his own county, he readily produced the white stone ware. At first the flints were reduced to powder to the great injury of the persons employed; but the

immortal Brindley, in the early part of his life, constructed the mills that are at present in use for grinding them in a moist state."

About the year 1750 commenced the inventions and improvements of the late Mr. Wedgwood, who, by combining science with the art, and having the advantage of a highly cultivated taste, not only greatly extended the uses of English pottery, and turned the tables upon the French and Dutch, who had hitherto exclusively supplied Europe with fine earthen-wares, but rendered it an object of admiration, and deserving a rank among the fine arts of the age. This inestimable man has left us an admirable example of what may be effected by cultivated talents and persevering industry. Such investigations as those to which he was accustomed, bring with them their own reward. Such experimentalists

"Exult in joys to grosser minds unknown,
"A wealth exhaustless, and a world their own."

Porcelain is an artificial compound of great durability. When good, it is of so campact a texture that it would probably endure for ages. There is an octagon tower at Nan-king in China, called the Porcelain Tower, which is entirely covered with the most beautiful china. It is a building of nine stories, nearly 300 feet high, and each story decreases in breadth, as it rises in height. This singular and elegant edifice still retains its original beauty, though it has sustained the continued action of the sun and weather for four hundred years.

An interesting account of the processes which are carried on in the great French manufactory of porcelain at Sevres, has been published by Brongniart, who superintends it. See Philosophical Magazine, vol. xiii. xiv.

The Chinese are said to let their clay remain exposed to the atmosphere at least 20 years before they use it in making porcelain. Some tile-makers in England, who are curious in the article they manufacture, never use their clay till it has lain a year or two in the open air.

It is probable that some of the most esteemed of the porcelain clays may owe their estimable properties to an admixture of mag-

nesia. In Nicholson's Journal, vol. xii. we read of a porcelain earth, hitherto considered pure clay, having been analysed, and found to consist only of carbonate of magnesia and silex. Magnesia, I understand, is of use in porcelain, by lessening the degree of contraction to which all kinds of earthen-ware and porcelain are liable.

The beautiful colours, which are seen upon porcelain, and earthen-ware, are given by metallic oxides. Purple is given by gold; red by the oxide of iron; yellow by the oxide of silver; green by copper; blue by cobalt; and violet by manganese.

In another part, Mr. Parkes informs us, should pure silex be wanted for chemical experiment, it may be procured by fusing common flint stones with three or four times their weight of potash, dissolving the product in water, and then taking up the alkali by the addition of an acid, which will precipitate the silex, which is to be well washed for use. The siliceous stones should be previously heated red in a crucible, and plunged in that state into cold water. This will render them brittle, so that they may easily be reduced to powder before they are mixed with potash.

HISTORY OF THE INTRODUCTION OF THE MANUFACTORY OF ALUM INTO ENGLAND.*

TOWARDS the latter end of Queen Elizabeth's reign, a discovery was made of the utmost importance to Whitby, and the country which surrounds it; it was to find that the coast there, every where abounded with alum rock. Thomas Chaloner, Esq., afterwards Sir Thomas Chaloner of Guisborough, being upon his travels, and in Italy, carefully examined the Pope's alum works, near Rome, which were then the only manufactories of that article in Europe, and were very beneficial to his holiness, bringing him in yearly a very large revenue. Mr. Chaloner recollected there was a mineral exactly of the same kind, in the neighbourhood of Guisborough, and was very desirous to try if erecting an

* From the Tradesman, or Commercial Magazine—April, 1802.

alum work there, would not greatly advance the income of the Chaloner family. But as he was entirely a stranger to the process, he found it would be absolutely necessary to procure some artists well acquainted with the whole mystery. These he knew were no where else to be had but from the Pope's alum works; for which reason he tampered with some men of ingenuity who were employed there, and partly with money, and partly with promises of large rewards, engaged two or three of them to come over with him to England. But as a discovery of his design would infallibly have subjected him to capital punishment in the Pope's dominions, for the preserving of secrecy, he had them packed up in large casks, and in that manner clandestinely conveyed them on board a ship, then ready to sail for England. With this acquisition, getting safely off, he made the best of his way for Yorkshire; and immediately after his arrival, began to erect an alum work, very near his own habitation, which afterwards completely answered his expectation, and brought him in yearly a very large revenue.

The Holy Father when informed of all these proceedings, was extremely provoked, and some considerable time after their leaving Italy, thundered out a dreadful curse against Mr. Chaloner, and the journeymen alum-makers who had eloped with him. This curse from the then head of the Christian Church, though every line of it breathed revenge, and every clause of it was for the everlasting damnation of the poor alum-makers, had not the effect for which it was intended; it hindered not Mr. Chaloner and the workmen who were with him, from making alum; it neither struck their minds with idiotism, nor their limbs with palsy; it neither extinguished their furnace fires, nor overturned their boilers. But this it did; it discovered to the Christian world, how heartily and sincerely the holy successor of holy Peter, was able to curse and to swear; and how he could bellow out those curses in the names of the most holy Trinity, the mother of God, and all the holy angels, saints, confessors, and martyrs! And what was all this congregation of

Powers and dominions, seraphims and thrones to effect?

Why truly to assist his holiness in a commercial monopoly! To break up an English alum manufactory! To annihilate a brother tradesman!

Tantæne animis cœlestibus iræ?

It is sometimes said that two of a trade cannot agree; perhaps this proverb, which like many other proverbs, took its rise in the times of ignorance and presumption, originated in the curses of this successor of St. Peter!

But let us turn a moment from the curses of this proud priest, to contemplate a useful subject. Mr. Chaloner, and the workmen who curst not at all, proceeded in the manufactory, which flourished like a tree by the river side. The price of this article was of consequence considerably reduced. Mr. Chaloner got money so fast (in despite of the curses and pride of that theologian,) that it excited the emulation of several neighbouring gentlemen, who were very desirous of sharing in so beneficial a trade. Thus it seems the curses of the Pope, like the blood of the martyrs, which our popish Queen bade to burst from their veins in the horrors of the stake, only spread the benefits which these religionists wished to blast; but as there was little hopes of Mr. Chaloner admitting them into partnership, the Darcy family, after the year 1600, began to erect a second alum work, not far from that of Mr. Chaloner's; this also brought so much gain to its owners, that about 1615, another was formed near Land End, within three miles of Whitby, whose profits were so great, that it still further excited others to venture, and in consequence, this business was established on a foundation not to be overturned; it was, as if built upon a rock.

But here the advantages of this new manufactory did not stop; it was necessary that large quantities of coal should be procured, an article then but little known in that coast; these they procured from Newcastle and Sunderland, and to secure this connexion, a design was formed to have vessels always in readiness to go to sea in moderate weather. Some of the fishermen offered their services for this work, and then vessels of burden, about 1615 began the trade with Newcastle; they afterwards ventured to

London with alum, fresh butter, &c. and returned laden with merchandise, which was sold at Whitby with considerable advantage; and then also began the coasting trade, the ships employed in which, did not carry alum.

IVORY BLACK.

Specification of the Patent granted to William Docksey, of the city and county of Bristol, millright; for considerable improvements in the Process of manufacturing Ivory Black; and for pulverizing, grinding, or reducing to a subtle and fine Powder, all articles capable of a more easy separation of their parts or constituent principles by torrefaction, heating, or calcination, in open or close kilns, ovens, or furnaces, especially potters clays, flints, colouring and glazing materials.

Dated May 22, 1810.

TO all to whom these presents shall come, &c. Now know ye, that in compliance with the said proviso, I the said William Docksey do hereby declare, that my said invention is fully described and ascertained in manner following; that is to say: My invention consists in manufacturing ivory black, and all articles capable of an easy separation of their parts or constituent principles by torrefaction, heating, or calcination, such as potters clays, flints, colouring and glazing materials, with a very small quantity of water, in grinding or reducing the said articles to fine powder; by which means or process much machinery and labour employed in the processes now used in manufacturing the said articles with a large portion of water are avoided, and the stoves employed to heat the rooms or other places for evaporating the water used in the processes now practised rendered unnecessary, and which processes of drying ivory black greatly hurt and impair its colour.

In order that my several improvements may be clearly understood, I shall proceed to detail my processes more particularly, premising, that I do not mean to confine myself to the exact machinery and processes here described, in which divers variations may be made, as my invention depends on grinding or reducing

the several articles above mentioned to subtle powder, by omitting to use any considerable quantity of water.

First. To manufacture ivory black, I take the bones and sloughs of the horns of animals, and calcine them to blackness, in close or air-tight vessels. I then crush them in their dry state, between metal rollers, of about two feet diameter, until they are broken sufficiently small to pass through a hopper into the eye of a mill-stone, and be reduced to powder between mill-stones, in an horizontal situation, exactly similar to the method of reducing or grinding corn or grain to flour. By a like process, the powder thus obtained is then partly passed through a dressing machine, constructed with brushes and fine iron or brass wire, upon a circular frame, inclosed within a rim, which receives it. Such part as passes through the meshes of the wire (which should be about sixty-eight to an inch) is sufficiently fine for use, and is damped down by a small quantity of water sprinkled upon it, and packed for sale; the coarser part is returned to the hopper, and ground over again between the stones.

Secondly. In respect to the flints, potters clays, and colouring and glazing materials, my method is to take calcined flints, dried clays, calcined lead and lead ores, manganese, or whatever article is proper for glazing, and pass it under stampers or heavy hammers, to break or bruise it in small pieces, sufficiently small to pass between metal rollers, where it is crushed so fine as to be reduced to a pulverulent state; it is then ground in its dry state between mill-stones, in a manner similar to that before described for manufacturing ivory black. It is then passed through a dressing machine (inclosed within a very tight and close binn, which receives it); the coarser parts being thus separated, the finer parts are then mixed with water in a tub or deep vessel. The coarser parts are farther separated by subsidence, and the finer and thinner parts passed through a fine lawn or cypress sieve; the water is then drained off, and evaporated by heat from the substance, and the powder thus obtained is of a superior kind of fineness.

In witness whereof, &c.

REPORT, IN PART,

Of the Committee appointed to ascertain the number of persons employed in, and to inquire into the state and condition of the Patent-Office.

THE Committee first remark, that they accord with an opinion expressed in a letter to them by the Secretary of State, that "every institution ought to be comprised with some one of the departments of government," and offer for the consideration of the legislature, the propriety of authorising a new department, to be called the "*Home Department.*" They then proceed,

The gross amount of fees received from the commencement of the establishment to the 31st of December, 1811, is $ 48,110; of the sums received after deducting the amount paid for salaries to a clerk, and the monies necessarily expended for parchment, stationary, printing, fuel, &c. there remains a balance of $ 25, 379.34 in the treasury of the United States, applicable to useful purposes connected with this institution. The statement demonstrates that the amount annually received for patents issued has increased every succeeding year, and that in the year 1811 it amounted to $ 6,810 dollars; from these facts your committee augur favourably as to the future; the office has done much more than to support itself; the fund thus created, if properly managed and applied, may hereafter give rise to many valuable institutions in our country. A *school of arts* may be organized by the legislature, which will require no other pecuniary aid than will be contributed by the industrious, the ingenious, and the useful citizens of the United States.

It may be well to ask, what is the design of a *depot* of the models for which patents are granted? Idle curiosity alone cannot have induced the wisest governments to take them under their special charge. If useful results had not been the consequence of such establishments, they would long since have been abandoned. In Europe experience has developed the numerous benefits which are derived from this source every year. In the subsequent part of this report your committee persuade themselves they will lay before the legislature such details and facts connected with our

country, as will characterise the institution "a register of human industry and ingenuity." They anticipate the period when this *depot* will constitute the basis of a *school of arts*, from whence shall emanate every class of useful citizens. In this school all children may be taught some useful trade; to the end, that none may be idle, but the poor may work, and the rich, if they become poor, may not want.

Your committee made a visit to the present establishment. For its various purposes the west wing of the second floor of the building, heretofore denominated Blodget's Hotel, is allotted to the models. This portion of the building consists of four apartments; one of which is 56 feet by 39 feet; another 39 feet by 22 feet; the remaining two rooms 22 feet by 12 feet each, with ceilings well adapted for the purpose. Your committee propose that the two first mentioned rooms shall be appropriated *solely* for the placing and exhibiting of models; one of the smaller rooms to be occupied as an office by those who conduct the institution, and the other to be used for a library, to be formed of such books as may be deposited to secure the copy right, for charts, &c.

The apartments are at this time in an unfinished state. Workmen are employed to complete them; a sufficient appropriation for this purpose has been already made by congress.

Many models are already deposited. The manner in which they are placed tends to confusion, and to sink the establishment into contempt. All is chaos. The machines are out of repair and so intermixed as to make them almost useless. Useful machines are thus kept from view, and for the want of a proper catalogue containing a general description of the models, they are not understood. By such means the most beautiful inventions have been brought to ridicule. The despatch, safety and success of business is promoted by nothing so much as method and regularity. Every visitor ought to be able to derive benefit from this *depot;* this can only happen where method is attended to. The subjects of this establishment admit of *classification* according to fixed and established principles. All the apparatus used in distillation, the machines for cutting nails, for cutting files, for gin-

ning, carding, roving, drawing, spinning, weaving, &c. should be contiguous to each other, and arranged according to the date of the patent. Placed in this manner there would be a mass of knowledge embodied before the spectator; the arts would be easily traced, the machines would thus be advertised as it were, and every one would go away much more informed than when they went into these apartments. The present prevalent confusion in some degree depends upon circumstances. When the machines were formerly deposited near the department of state, the room was much too limited; the machines were heaped together, and many of them were deranged in their several parts. The unfinished state of the present building will keep the models for a further time in a state of irregularity; it is to be hoped that habit will not operate to make this perpetual. Success in this institution depends much upon the competency of the person or persons who are to conduct it. They should be liberal in all their views, no wise ambitious to become patentees themselves; no jealousies should exist between them and inventors. To the latter every facility should be offered and every aid given; because, often they are men of limited knowledge and need the assistance of others in their specifications, &c. Under such guidance the institution will be promoted, and useful knowledge diffused throughout our extensive country.

To impose upon ourselves the task of proving the utility of this institution, may to many appear idle and unnecessary. We have determined on the inquiry, and solicit your indulgence on the subject. By the acts which congress have passed relative to patents, it is indirectly provided, that such a *depot* shall be formed. In the United States no patent can issue to guarantee *a mere principle;* it "must be for the vendible matter:" hence the necessity of a *conservatory* to prove the facts in disputed cases. The act further requires models to be *deposited* in such cases as the secretary of state shall deem necessary. The arts have ever been patronized and protected by civilized nations: the ancient *republics* bestowed much upon the fine arts. At this time our object should be to promote those which are termed *useful.* Though

we cannot but admire the taste and genius of a Pericles or a Phidias, we deem it more consistent with the state of society and manners in the United States, to mark with distinguished honours an Arkwright, a Bolton, a Watt, a Wedgewood, a Whitney, a Fulton, a Whittemore, an Evans, and a host of others who compose the class of benefactors of the human race. Their inventions not only astonish and confound by the intricacy of their structure and the delicacy of their execution....they do more; they enrich a people and constitute the formidable pillars of national independence. Useful machinery excite human industry; circulate capital; expand the wings of commerce, and carry us to the remotest regions of the habitable world. The progress of the arts and civilization, keep pace with each other. The arts are favourable to civil liberty: they alone give rise to internal improvements; and that nation is of all others the most certain of prosperty, by which these principles are well understood and put into practice. America cherishes peace. Circumstances may force her into a war. Even in that state of things her arts will achieve more lasting advantages for her, than did the conquests of an Alexander, a Cæsar, or a Zengis Khan!

Useful inventions of machines are more particularly necessary at this time in the United States, when much may depend upon our manufactures. All labour-saving machines add so much to our population. We do not dread that riot and famine will follow the introduction of such agents into our workshops: we should do all in our power to encourage their importation from abroad. In this respect England is an example worthy of imitation. Whilst tyranny and oppression, from mistaken notions of policy, were operating with an iron hand upon the industrious in Flanders and France, England did all in her power to invite their emigration; every encouragement was given to them, and many advantages were offered. By such means did she establish her power and wealth; which, at this time is gigantic, and threatens neutrals and herself with annihilation from its misapplication. Our inventions keep pace with our necessities. It is not long since we dreaded the want of blankets. American genius has suggested a simple

method by which a single workman can furnish twelve per diem. Almost every department of the mechanical arts was languishing for the want of *files*. Several machines have been lately invented for cutting these highly useful instruments. With one of them a single workman may make several hundred files per day, which may be sold at prices much below the imported! Who, with a knowledge of facts like these, can deny protection and security to the useful arts? Such inventions will do more for the nation than can be effected with armies and fleets. It is certain fleets and armies cannot be supported without them.

We shall now give a short historical sketch of the subject in Europe, and then trace its progress in the United States. Two centuries have elapsed since Henry the IV. of France, conceived the great design of a *conservatory* of models of whatever was curious or useful in machinery, "that all those (to use the language of Sully) who aspired to perfection, might improve themselves without trouble, in this silent school." The death of Henry put a stop to the execution of this scheme: in it he was followed by other monarchs, and by none with more zeal than those of France. In modern times, we may refer even to the dark pages of *revolutionary* France for many proofs of the devotion of that nation to this highly useful branch of knowledge; and at the present period the useful arts are well understood and cultivated with much success throughout that empire: liberal rewards are offered by that government for such inventions as may prove of national benefit. The enormous sum of $ 183,332 is offered as a premium for a machine which will prepare and spin *flax*, in as perfect a manner as is done with *cotton:* the ingenious of all nations are invited to become competitors for this prize. The emperor has taken this department under his own direction, and no patent is granted "without a special decree from Napoleon." This arrangement gives consequence to the establishment. Not content to stop here, a professor is appointed *especially* to deliver lectures on machines: he discourses on the models generally, and at stated periods accompanies his pupils to observe the machines in the different workshops of Paris and its vicinity; the operations of

the various manufactures are demonstrated, and a general discussion of all the principles which are connected with the useful arts, is entered into and exemplified by practice. This institution furnishes, annually, a considerable number of useful members of society. In the establishment just alluded to, persons are employed, whose duty it is to form models of all such valuable machines as are deposited; these are on a regular scale and accurate in the proportions of the several parts, so that the model will move correctly and produce effects proportioned to its size: machines may be made from these of any dimensions. In France, schools for instruction in every art and science are diffused throughout the empire; no useful branch is neglected: the teachers are very numerous, and each institution has a fixed number of pupils, who are supported at the expense of the government; they are taught to arrange, plan and execute all the operations which can be of use to the nation. In cases of emergency that empire may draw upon this capital stock for useful men of every description, whether it be in philosophy, the various mechanical arts, the military art, &c. &c. If the United States were equally prepared at this momentous period, much expense would have been saved to the nation, and much trouble to the government. We repeat it, a *school of arts* is essentially necessary to our country. In the German schools they have professors, whose duties are like to those in France. At Gottengen, professor Beekman, the author of three volumes of the history of discoveries and inventions, was employed. In England, in the royal institution, they take a proper notice of this subject, and no one has ever visited the *depot* of models at the *Adelphi*, without much pleasure and instruction. In Britain, where great distinctions are made in society, many persons occupy themselves with the useful arts, whose rank would seem to forbid it: and several noblemen of distinction have patented useful inventions. If then all other nations deem it wise and essential to bestow favours in this way, shall it be said that in the territories of the only free republic of modern times the arts were ridiculed and neglected? This can never be the case with those who understand the true interests of the state; the national genius

forbids it, and nothing can stifle this *infant Hercules* of the United States. No nation can boast of more useful inventions than those of the people of the United States. We might bring to recollection many, which alone could have resulted from the exercise of genius of a superior order. *Rittenhouse* contrived and set a world in motion. *Whitney* furnished us with a simple machine by which the people of a world are enriched, and made happy!

In obedience to resolutions passed by the house of representatives of the United States, the secretary of state has reported, that from the 31st day of July, 1790, when the first patent issued from the office, to the 31st day of December, 1811, inclusive, one thousand six hundred and thirteen patents have been granted; of these 215 were for inventions patented in the year 1811; during the present year (May, 1812) 121 patents have been already delivered; 20 are in preparation, and 20 more are suspended for the want of proper and suitable specifications. For several years past, the number has increased annually, and an annual report of them has been directed to be made to congress. This review of the progress of the arts, is highly gratifying to us as citizens of the United States. We now see them flourish in situations where the footsteps of the savage have been scarcely obliterated by the busy scenes of civilized society. Establishments are multiplying in all directions. Nothing but time and proper encouragement are wanting to bring them to perfection. Superficial observers and persons who are not accustomed to study, are apt to treat this subject lightly, and sink it into contempt: they undervalue inventions of every kind, and consider them more the results of chance than of mighty conceptions, and painful thought. The sight of a *steam engine* in motion, must convince the intelligent observer, that the conception which gave rise to this stupendous monument of human invention, is too vast for ordinary comprehension. Persons thus disposed know little of the human mind: experience has not taught them the evils resulting from restless nights and the many disappointments which await projectors; they often exclaim, what necessity or justice in granting rewards for discoveries? They say it cost nothing to effect

the object. Such persons hsve minds too limited to conceive a brilliant idea, too callous to receive a delicate impression, and a heart too cold to reward original genius. It is a habit with some to despise the knowledge of others. In answer to these declaimers we will offer the remarks of Burgh: he says, when treating of projects and schemes, "there is not one of a hundred that ever succeeds at all; nor one of many hundreds that brings to their inventors any thing but disappointment and ruin. So that we observe accordingly, whoever projects any thing new in science, in mechanics, or in trade, seldom does more than open the way for others to profit by his ingenuity." Notwithstanding experience has proved these statements beyond contradiction, many deny to inventors ordinary justice. They do not require of you to yield your privileges or property to them; they request of you simply *to do as you would be done by*, and only to confirm them in that, which has already been made theirs, by the sacred decrees of the Great Creator of the universe. Too often do persons take advantage of the inventions of others and deny them compensation; they are considered as common property. It is with difficulty that the case is brought to a decision before a court of justice, and not unfrequently the inexpediency of awarding in favour of the plaintiff is to well maintained by a jury of *interested* persons: our court records furnish too many instances of this kind. It becomes us to guard against them in future, by a modification of the statute of the United States, which shall *unequivocally* secure to inventors their discoveries and inventions.

Before the adoption of the present constitution of the United States, the several states, as sovereign powers, granted patents. The framers of the constitution deemed this an object worthy their protection; and amongst the powers *delegated* by them to congress, we find that "to promote the progress of science and the useful arts, by securing for limited times to authors and inventors, the exclusive right to their respective writings and discoveries." Congress, pursuant to the recited constitutional provision, enacted a law on the subject, February 21st, 1793; another April 17th, 1800, and during their present session these several

acts are under consideration, to be revised and amended according as experience may have made it necessary. By these acts, the fees which are directed to be paid by the *patentee* are inconsiderable.....not one fifteenth of the amount which is paid in Great Britain. It never was contemplated to derive a revenue from this source. The original intention was to make the amount received sufficient to cover the expenses of the institution. The statements herewith exhibited, prove that a *surplus fund* has accumulated in the treasury, applicable to such purposes as the legislature shall direct.

We do not hesitate to acknowledge that patents have often issued for inventions apparently trivial and ridiculous. On this ground many object to the institution. Reflection will remove this difficulty. The patent costs the state nothing, and from trifling causes wonderful consequences have ensued. *Newton*, from observing the falling of a *pear*, deduced his brilliant theory of *gravitation;* and no year passes in which the principle, inherent in a trifling machine, does not give rise to many valuable applications. You cannot limit in this respect; the constitution guarantees to every one his original inventions, and no harm can result from this practice; the patentee can alone be disappointed in his expectations; no one will purchase that which he deems useless, and a very few, indeed, speculate so far as to give premiums for inventions without having previously seen their promised advantages demonstrated by practice. England sets a high value on objects of this kind....she encourages the introduction from abroad of every useful machine, and she prohibits, under heavy penalties, the exportation of such as are useful in her manufactories. In the year 1774, an act was passed "to prevent the exportation of utensils employed in the cotton manufacture." In England, any person going from Great Britain, and who carries with him the tools and instruments of any useful art or manufacture peculiar to his native country, "must be deemed a traitor."

We can defend this branch of knowledge upon the ground of an enlarged and wise policy: our supplies of clothing and other articles have been generally derived from British manufactures;

that nation has made us tributary to her work-shops, in common with the rest of mankind. This system has been carried so far as to affect the independence of the United States. We may soon be engaged in a war with that power. Propriety and necessity combine to carry us into other channels. We need not leave our shores for this purpose. Unlike Great Britain, our agriculture furnishes us more food than we can consume, and yields us the raw materials from which *that most dependent of nations* has been heretofore supplied. We only need labour-saving machines to form these into the fabrics which habit, comfort and fashion have made necessary in civilized society. Some say this is impossible; they do not know that the greatest changes in this way have taken place in England within the last thirty years! A revolution is at this time about to take place, by which all nations will free themselves from the shackles which heretofore bound them to Great Britain, and allowed them but a nominal independence. This revolution can alone be perfected by the agency of the useful arts. Great Britain is dependent upon foreign nations for eight-tenths of the raw materials which are used in her manufactories, and the few which she derives from her internal resources are forbid to be exported. As an indulgence in this respect, in the year 1777, it was enacted by parliament, to permit "the exportation of tobacco-pipe clay," it being necessary to the sugar-makers in the West Indies. All American trade has concentred in England; whether it be to the Mediterranean, the Euxine or the Baltic. Thus have we contributed much to the support of British fleets and armies for many years past. The great pressure occasioned by the enormous national debt of Great Britain, and the increase of the annual taxes, may cause distress, turbulence, riot and bankruptcy; even a change of the present *dynasty* may be the consequence....all these circumstances combined will not effect the reduction of that *gigantic* power. Changes like these, experience has proved, are only changes of men in power; the nation still remains compounded of the same great mass, with her capital and skill undiminished, which, by a judicious system of reform, will secure to her power and wealth. England can only be seriously

affected by striking a severe blow at the roots of her industry, the great base upon which her security is founded. A war against Great Britain will be inefficient, if carried on solely by your armies and fleets. By paralyzing her arts and manufactures, you destroy her vitals; the heart will be seized by a canker which will render the extremities inefficient and useless.

The effects and benefits in a national view, resulting from the introduction of useful labour-saving machines, may be traced and demonstrated in the rise and progress of the British cotton manufacture. Not longer ago than the year 1755, the cotton manufacture in England was considered "amongst the humblest of the domestic arts;" the products were chiefly for home consumption. Machinery in this branch was then unknown. In the year 1750, twenty thousand persons only were employed in this way....little progress was made for several succeeding years. In the year 1806 they declared, "*there is scarcely a civilized nation on the earth that is not indebted to us for some article of this manufacture.*" Some Manchester manufacturers have furnished as many as two thousand different varieties of patterns on their cards, for the continent of Europe.

In the year 1705, not more than 1,170,881 lbs. of cotton wool was imported into England. In the year 1781 it amounted to 5,101,920 lbs., in 1810 to the enormous and incredible quantity of 135,000,000 lbs. This last fact we state upon the authority of Sir Robert Peel, the most extensive cotton manufacturer in Great Britain.

In the year 1797, the cotton branch took the lead in the manufactures of Great Britain, and continued to advance until the American and continental markets, from motives of policy, were shut against them. In the year 1809, it was calculated that this branch of industry in Great Britain gave employment to 800,000 persons, and that the annual value thereof, amounted to £30,000,000 sterling, or $132,000,000! The United States for many years, received more manufactured articles from Great Britain than the whole of Europe taken together. The following

statements are given from sir F. M. Eden's letters on British manufactures and commerce:

Years.	Exports to foreign Europe.	Exports to U. States.
1795,	£4,222,782	£4,892,572
1796,	4,497,683	5,835,640
1797,	3,732,830	4,871,316
1798,	3,981,650	5,313,068
1799,	4,543,608	6,696,221*

England has no advantages peculiar to herself. The introduction of useful machines gave her pre-eminence. Machinery enabled the people of England to sell their manufactured articles at reduced prices, and to undersell all other nations. In the year 1762, *cylinder* cards were first made use of by Mr. Peel. In the year 1767, James Hargrave made the first great improvement in the spinning of cotton by means of machinery, and Arkwright's first patent for spinning cotton by means of rollers, was obtained in 1769. The machine was put in motion by the application of horse power; in 1771 water was employed, and *now* that of *steam* is in general use. Improvements in this art have been carried so far "that a pound of fine cotton has been spun on the mule into 350 hanks, each hank measuring 840 yards, and forming together a thread 167 miles in length!" A single pound of cot-

* Nominal or current value of Exports from Great Britain to the United States, between the years 1805 and 1811, in pounds sterling.

1805,	11,446,939
1806,	12,865,551
1807,	12,097,942
1808,	5,302,866
1809,	7,460,768
1810,	11,217,685
1811,	1,874,917
Annual average of three years, ending 1807,	12,163,811
Annual average of four years, ending 1811,	6,464,059†

† From the London Monthly Magazine for July, 1812. *Editor.*

ton yarn in England has commanded the extravagant price of five guineas: so much has machinery added to the original value of the raw material, which, on an average, may be rated at 20 cents per pound! England, from these causes, progressed more in the last 50 years of the 18th century, than she did in any equal number of years in any former century. In the time mentioned the most useful inventions were brought to light and made perfect—with the arts the nation flourished, and assumed the form of a political *Colossus*.

We need not abandon our country to seek for examples where a nation has been benefited and enriched by the genius of her citizens. We could specify many instances of the kind. On this occasion, however, we will content ourselves with a consideration of that of Mr. Eli Whitney, a native of the state of Massachusetts: it is to his *cotton gin* that many in the United States owe their wealth and comforts; but for this or some equivalent instrument, poverty, barrenness, and waste would infest an extensive and valuable portion of the United States. The opinion of judge Johnson, an inhabitant of South Carolina, is too appropriate to be omitted: in deciding in the case of Whitney vs. Carter, he proceeded, "With regard to the utility of this discovery, the court would deem it a waste of time to dwell long upon this topic. Is there a man who hears us, who has not experienced its utility? The whole interior of the southern states was languishing, and its inhabitants emigrating for want of some object to engage their attention and employ their industry, when the invention of this machine at once opened views to them which set the whole country in active motion. From childhood to age it has presented us a lucrative employment. Individuals who were depressed with poverty and sunk in idleness, have suddenly risen to wealth and respectability. Our debts have been paid off; our capitals increased, and our lands are trebled in value. We cannot express the weight of obligation which the country owes to this invention—the extent of it cannot now be seen." Edwards, in his history of the West Indies, says, the *green seed* cotton offers many advantages to the manufacturer, but for the

want of a proper instrument to separate the wool from the seed, "the value of the commodity is not equal to the pains that are requisite in preparing it for market." Before the gin was invented, this species of cotton was only cultivated for domestic purposes, and for supplying wick for the lamps that are used in sugar boiling. Formerly cotton wool was imported into the United States; that obtained from the British West India possessions, on an average of three years, from 1768 to 1771, amounted to 167,748 lbs. and from other places 266,182 lbs. In 1783, after the peace with Great Britain, it was proposed we might furnish ourselves with the necessary quantity of cotton wool from the Dutch settlements at Surinam—no one then imagined it could be cultivated in the United States to be made an object of commerce. In 1791 it was proved that cotton might be cultivated to advantage in the United States. In the same year, 19,200 lbs., the growth of the United States, were shipped to Europe, and the want of a machine to separate the wool from the seed was soon found to be essentially necessery. But for the invention of Whitney, which was brought to perfection in the year 1793, the United States would have continued to be *importers* of this article. The annual quantity made increased every year, until in 1810, we exported of the growth of the country, 93,261,462 lbs., of which quantity 8,604,078 lbs. only, were sea island or long staple. Besides the quantity exported, 16,000,000 lbs. of the short staple are annually consumed in our country, which give an annual crop of 100,000,000 lbs.; this, at fifteen cents per pound, presents us with an annual income of $15,000,000. If the *saw gin* of Whitney had not been brought to light, the green seed cotton could only be cultivated by those planters who have a superabundant number of labourers on their plantations to give them employment, at times when they otherwise would have gone idle. Sea island cotton can only be raised in a very limited district of the union, and it is not so fit for all purposes as the other species. By hand an industrious man may pick 1 lb. of cotton per day; a machine of a moderate size, attended by a boy to feed it, will do the same for 1000 lbs. per

day. Horse, water, or steam power may be applied. One man may readily attend ten of these. The quantity they would furnish for packing is incalculable.

The facts we have just stated are known to all our cotton planters. Such of them as are connected with commerce, are derived from the treasury reports and books of authority on the subject. We could mention many other instances where valuable machines have benefited the United States. This is considered superfluous. Your committee, for the reasons which they have already assigned, must remain satisfied with offering this *report*, in part, for the present. Had time and circumstances permitted, they would have presented for your consideration, a detailed system, with rules and regulations for its execution. They indulge in the hope to furnish these at a more suitable time.

REMARKS.

The foregoing excellent report of the Committee, of which Dr. Seybert was chairman, contains many important truths, and will no doubt command the early attention of Congress. The patent laws of the United States imperiously demand a revision, and the whole establishment a new organization. The patent-office might then become, under proper regulations, a *school of arts*, from which the most important benefits might result to the United States. This subject shall be resumed. *Editor.*

PAPERS ON

RURAL AND DOMESTIC ECONOMY.

Directions for preventing calamities by FIRE. *Recommended by the "Massachusetts Fire Society;" with notes and additional directions by the Editor.*

1. KEEP your chimnies and stove pipes clean, by sweeping them at least once every month.

2. Never remove hot ashes in a wooden vessel of any kind, and look well to your ash hole.

3. After sweeping a hearth, see that the brush does not retain any particle of fire before you hang it up in any usual place.

4. Oblige all your servants to go to bed before you, every night, and inspect all your fire places before you retire to rest. For fear of accident, let a bucket of water be left in your kitchen every night. The writer of these directions once saved a house from being consumed by fire, by this precaution.

5. Do not permit a servant to carry a candle to his bed room, if he sleeps in an unplaistered garret.*

6. Cover up your fire carefully every night in ashes. Let the unburnt parts of the billet or chunks of wood be placed next the hearth, but not set upright in the corners, by which means no sparks will be emitted from the wood. Pour a little water upon the burning ends of the wood which are not completely covered by the ashes. Place before the fire a fender made of sheet iron. This contrivance was well known in England many years ago, by the name of Coversen. It has lately received (from a top being added to it) the name of hood.

* If they must have a light, let them take a small hand-lantern, surrounded with iron wire: such are made in Philadelphia for the purpose. *Editor.*

7. Remove papers and linen from near the fire, to a remote part of the room.

8. Shut the doors of all the rooms in which you have fires at night. By thus excluding the supply of fresh air, you will prevent a flame being kindled, should a coal or spark fall upon the floor, or upon any of the combustible matter in the room. The smoke which issues from the smothered fire, will find its way in every part of the house, and by waking the family may save it from destruction.

9. If sickness, or any other cause should oblige you to leave a candle burning all night, place it in such a situation as to be out of the way of rats. A house was once destroyed by a rat running away with a lighted candle for the sake of the tallow, and conveying it into a hole filled with rags and inflammable matter.*

10. Never read in bed by candle light, especially if your bed be surrounded by curtains.

11. Strictly forbid the use of segars in your family at all times, but especially after night. May not the greater frequency of fires in the United States than in former years, be ascribed, in part, to the more general use of segars, by careless servants and children? There is good reason to believe a house was lately set on fire by a half consumed segar, which a woman threw away, to prevent being detected in the unhealthy and offensive practice of smoking.†

12. Leave your shutter open in the rooms where fire has been kept.

In case of fire, attend to the following directions, to prevent or restrain its terrible consequences.

1. Do not open the room or closet door, where you suspect the fire to be, until you have secured your family and most va-

* A high funnel, or speaking trumpet put over the candle, would answer. *Editor.*

† A barn was burnt in New Jersey not long since from a boy smoking a segar in it. *Editor.*

luable effects, nor until you have collected a quantity of water to throw on the fire, the moment a fresh supply of air excites it into a flame. Where water cannot conveniently be had, try to smother the fire by throwing two or three blankets over it. A British sea captain once saved a king's ship, by throwing himself, with a spread blanket in his arms, upon a fire which had broken out near the powder room. He was pensioned for life for this wise and meritorious act.

2. In case it be impossible to escape by a stair-case, from a house on fire, shut the door of your bed-chamber, and wait until help can be brought to secure your escape from a window.

3. If safety does not appear probable in this way, wrap yourself in a blanket, hold your breath, and rush through the flames. If water be at hand, first wet the blanket.

4. To prevent fire descending from the roof, or ascending from the first story, form by means of blankets or carpets, a kind of dam on each side of the intermediate stories, near the stair-case, that shall confine the water that is thrown upon the roof, or into the windows. It will effectually check the progress of the fire downwards or upwards in brick or stone houses.

5. To prevent fire spreading to adjoining houses, cover them with blankets, or carpets, or old sails wet.

6. To extinguish fire in a chimney, shut the doors and windows of the room, or throw a quart or more of common salt into the fire. Hold or nail a wet blanket before the fire place. If these means fail, throw a wet blanket down the chimney from the roof of the house.

There is a method used in some countries of glazing chimneys, when they are built, by burning common salt in them, which renders them so smooth that no soot can adhere to them. Chimneys so constructed can never catch fire.*

Ladders are commonly used as the means of conveying persons from the windows of houses on fire. Would not a long and

* The mode of constructing and of plastering chimneys so as to prevent the collection of soot, shall be given in a future No. of the Archives. *Editor.*

stiff pole, with a rope fixed on its upper end, be more portable and convenient for that purpose.

The famous Mr. John Wesley, when a child, was taken out of a window in his father's house whilst in flames, by one man standing upon the shoulders of another.—This practice may be used to rescue persons from the first story of a house on fire, when other means cannot be had with sufficient convenience or expedition.

Additional directions by the Editor.

To extinguish fire in the clothes of Women and Children.

Wrapping the sufferer up in a carpet, if there be one on the floor, and not nailed down, or a great coat, or blanket, will answer the effect; or "passing the hands under the clothes, to the sufferer's shift, and thus raising them together over the head.* If the female folds her arms before her, the business will be facilitated; and if alone, she may in most cases relieve herself by throwing her clothes over her head, and rolling or lying upon them." Tilloch's Philos. Mag. No. 118.

It should be explained to females and children, that as flame always flies upwards, if they continue in an upright posture, the fire has a greater power, and the neck and head run a great chance of being hurt. It is, therefore, better to throw themselves upon the floor or ground, and roll themselves on their clothes, which will retard the progress of the fire until assistance be procured. Philos. Mag. No. 122.

The Editor knew a child to be saved, many years since, from death, after its cotton frock had taken fire, by an old lady rushing into the room, pressing the child close to her, as he stood, wrapping its body up in her spacious gown, closing it at the same time round the neck, so as to prevent the current upwards. The fire was thus smothered in an instant. A MODERN FASHIONABLE LADY, with her narrow skirt, could not do this.

* Raising the clothes up and closing them well round the neck, will obviate the danger, of suffocation, arising from throwing the clothes over the head.

Editor.

In case of scalding water falling on the feet, they should be plunged into cold water as quickly as possible, without waiting to pull off the stockings if they are on; for the skin will inevitably come off with them, and increase the pain greatly. When the first agony of the sufferer is over, the stocking may be cut off.

When a room is on fire, the smoke being lighter than the common air, always ascends: it has been advised, therefore, to creep on the hands and feet, to remove any object; and it is stated in the London Monthly Magazine for January 1812, that the linen having taken fire at Corby Castle, the destruction of the premises was prevented by these means. It was attempted in vain to enter the room in an erect posture, without danger of immediate suffocation, but by crawling or stooping low, the atmosphere near the floor was found so clear, that it was entered without inconvenience, the linen saved, and that part which was in flames dragged out.

METHOD OF CLEANING MUSTY CASKS.

By M. LENORMANDES.

From the Annales des Arts et Manufactures.*

THE author mentions, that he was taught the secret by a countryman.—He took, says he, "cow-dung *very fresh*, and diluted it with warm water, so as to make it sufficiently liquid to pass readily through a large tunnel. He previously dissolved in this water 4 lbs. of common marine salt, and one pound of alum. The quantity of this liquid, was equal to about a sixteenth part of the capacity of the cask. He put the whole in a pot, and heated it to ebullition, stirring it continually with a wooden spatula. He poured the hot liquor into the barrel, bunged it tight, and shook it five or six minutes every two hours, taking care, after every shaking, to pull out the bung, when a thick vapour,

* Translated in Repertory of Arts, Vol. I. New Series.

with a strong smell of must, issued from it. Twenty-four hours afterwards, he rinsed the barrel till the water came from it perfectly clear. During this operation, some water was heated, in which had been put two pounds of salt, and half a pound of alum, which he poured quite hot into the barrel; he shook it once, as in the former operation, and left the barrel well bunged. Two hours after, the water being still warm, he emptied it out, leaving the barrel to drain, and bunged it up very tight, till it should be wanted for use. A greater quantity of cow-dung, salt, and alum, than the above, will not injure the operation.—Cow-dung must be used, that of oxen is useless.

ON THE DIFFERENT DURABILITY OF CANDLES.

IN p. 57, the result of an experiment on the burning of two candles of the same size, (sixes to the pound) was mentioned, and the cause of the difference of the time required for their expenditure, was attributed to the difference in the firmness of the suet used in their composition. The greater or less degree of firmness, was referred to the nature of the animals producing it, and to the food by which they had been fattened. Other causes however contribute to the same effect: these are,

1. The material composing the wick. Wicks of cotton, cotton and tow, or tow alone, and one strand more or less, will cause a candle to burn a longer or shorter time, although of the same size and same number to a pound.

2. The degree of fatness of the animal, from whose suet a candle is made, has a great influence on its durability. It is constantly found that the fat of over ripe animals, whatever may be the nature of the food, does not make candles of so good a quality, as the fat from beasts moderately fat: the fat in the former being more oily and less firm, than in the latter. With respect to the qualities of the fat of different quadrupeds, the intelligent mechanic from whom the foregoing facts were obtained, added, that beef suet, when the animal was not over-fat, made the best candles: that South American fat of a good quality, that

is, white, which is exported in skins from La Plata, and is the product of wild oxen moderately fat, makes excellent candles, and will bear the heat of a warm climate better than candles made from any other fat: but owing to the careless manner in which the fat is melted by the natives of South America, it is often burnt and discoloured, and from this cause it happens that but a small quantity in a skin, will answer for that purpose.

3. Stall fed animals, and such as are fed upon oil cake, do not make as firm fat, as when the animals graze at large, or are wild: and hence the candles sent from England, (where flax-seed cake constitutes a chief part of the sustenance of cattle in the stalls) do not keep well in the West Indies, while those from North America, remain firm and do not run. In the United States it is well known that Indian corn enters largely into the food of all stall-fed cattle.

FRENCH RATAFIA.

COMMUNICATED BY A LADY.

TO four quarts of brandy, take four ounces of the kernels of apricots and peaches; bruise them in a mortar; take the thin parings of twelve lemons and six oranges; bruise an ounce of coriander seed; break half an ounce of cinnamon in small pieces; and take twenty whole cloves; mix all these with the brandy, and let them stand a month or six weeks, stirring them frequently; then strain all through a sieve, clarify, and make a fine syrup of a pound and a half of fine loaf sugar, which mix amongst the spirits, and bottle it up; put the corks loose in, and let it stand until it is quite fine, then pour it from the grounds into other bottles—and the materials left, with the addition of a little more brandy, makes a good cordial or good seasoning for puddings, &c. If you cannot procure apricots and peaches, bitter almonds will do, only take but half the quantity.

SCOTCH MARMALADE.

The people of Scotland it is well known, are famous for Marmalade, and often prefer it to butter at breakfast. Mrs. Boswell sent from Edinburgh to Dr. Johnson in London, a pot of the article of her own make, as a great present. The following receipt as well as the preceding one, is communicated by a lady from Scotland, who is eminently skilled in the knowledge of domestic economy.

TAKE the same weight of oranges, as of sugar; grate one half of the roughest part of the oranges, and pour boiling water over the grate. Cut the fruit across as a lemon for punch, and squeeze them through a sieve, boil the skins tender, and scrape the inside all out; then cut them into very small chips, and let them boil until they are transparent. Then put in the juice, and the water strained from the gratings, and let all boil together until the juice jellies, which you will know by cooling a little of it in a saucer.

TO PRESERVE HAMS,

OR OTHER SMOKED MEAT THROUGH THE SUMMER.

WRAP up the meat in tow, of either flax or hemp, after shaking out the loose shives, and pack it in a tierce or barrel, taking care that there be next the tierce and between every piece of meat, a thick layer of tow packed in as close as possible; then set it away in a dry cellar or upper room. It is enough that the barrel or tierce be sufficient to keep the mice out, as no fly or insect will enter the tow.

Tow and flax are such bad conductors of heat, that a piece of ice will be preserved a long time wrapped up in tow. Cut straw also answers extremely well to keep hams in. Ashes are apt to communicate a bad taste to meat. Care should be taken to prevent the flies from having access to the meat before being packed away.

ON SPONTANEOUS INFLAMMATION.

ABOUT the 10th of July 1812, twelve hundred bushels of Virginia coal were put into a close cellar in Philadelphia; and about the middle of September, the owners wishing to remove from the establishment, sold a great quantity of it. The coals were then found to be so hot, and to emit so much smoke, as to excite alarm, and required several hogsheads of water to cool them. This coal contained a considerable quantity of sulphur. The same quantity of coal had been put in the same cellar, several times during the last five years, without shewing any disposition to heat.

About the time that the occurrence just mentioned took place, the coal in the great vault at the water works, at the Centre Square, containing between 16,000 and 18,000 bushels of coal, also from Virginia, was observed to be very hot, and upon removing the surface of it, under one of the vault trap-doors, which are even with the ground, a dense smoke immediately issued. By throwing out several hundred bushels of the coal, and pouring an immense quantity of water into the vault, the progress of the combustion was checked. Such was the degree of heat extricated, that one man could not stay in the vault to shovel out the coal more than a few minutes at a time: some lumps of coal were completely reduced to cake. The vault had been filled to the top, and was of course deprived of air.

In the memoirs of the Royal Academy of Paris, it is stated that two magazines containing each about twelve hundred chaldron of stone coal, took fire shortly after they were filled. The magazines were built close and compact, they were also covered in and filled close to the top. After the fire was extinguished, a rafter of deal which was within the building near the door, was found half burnt, and a beam which the coal touched, was in the same condition; they had not flamed, but were burnt quite through to a cinder: the coals that lay on the top of the heap were only warmed by the smoke that had passed through them, but those in the middle had lost their inflammability and were

half calcined, but near the bottom they had suffered no injury, nor even contracted the least heat. It is also stated that previously to the construction of those magazines, coal had been constantly kept under a frame shed in vast masses, constantly exposed to the weather without accident.*

A similar accident took place in Philadelphia some years since, from a large quantity of Virginia coal being heaped under a close arch.†

In the year 1794, 1600 tons of coal which had been collected at the king's ship yard, Copenhagen, inflamed after some time, and was entirely consumed, together with 1400 houses.

In the Domestic Encyclo.‡ (article Inflammation) the editor has enumerated some substances, which under particular circumstances spontaneously inflamed; and it may be serviceable to mention, as a caution to woollen manufacturers, that it is stated in a Liverpool paper, that a destructive fire at Lodgemore mills near Stroud in Gloucestershire, which happened in June 1811, was occasioned by a quantity of flocks impregnated with Curriers oil being left on the floor.

* Gentleman's Magazine, 1763.

† See Dr. Seybert's paper on Spont. Comb. Med. Repos. Hexade 3d. vol. 3. p. 220.

‡ Philadelphia edition, 1803.

PAPERS ON AGRICULTURE.

ON THE CULTIVATION AND MANUFACTURE OF WOAD. IN A LETTER TO THE PRESIDENT OF THE BATH AND WEST OF ENGLAND AGRICULTURAL SOCIETY. BY MR. JOHN PARRISH.

(Continued from p. 63.)

HAVING said all I conceive necessary on the cultivation of woad, I now proceed to say something on its preparation for the use of the dyer.

Woad, when gathered, is carried to the mill, and ground. I need not describe this mill, because they are to be seen in open sheds in several parts of England, only that I conceive some improvement might be made in their construction, so as not so much to press out and waste the sap, which contains the very essence of the dyeing principle. These mills grind or cut the leaves small, and then they are cast into heaps, where they ferment, and gain an adhesive consistence;* they are then formed into balls, as compact as possible, and placed on hurdles lying horizontally in a shed one over the other, with room for air between, to receive from the atmospheric, air a principle which is said to improve them as a dye, as well as to dry them to a degree proper for being fermented; but in summer these balls are apt to crack in drying, and become fly-blown, when thousands of a peculiar maggot generate, and eat, or destroy all that is useful to the dyer. Therefore they require attention as soon as any are observed to crack, to look them all over well, close them again, so as to render them as compact and solid as possible; and if the maggot or worm has already generated, some fine flour lime strewed over it will destroy them, and be of much service in the fermentation. These balls, if properly preserved, will be very heavy; but if

* In a dry place, if these leaves remain a fortnight, being occasionally turned, they will become more adhesive, and have less juice to squeeze out in balling. The balls must be compact.

worm-eaten, they will be very light, and of little value. They are then to be replaced on the hurdles, and turned, not being suffered to touch each other, until a month or more after the whole that is intended for one fermenting couch is gathered in, ground, and balled, and often until the hot weather of summer is past, to render the offensive operation of turning it less disagreeable, and not so apt to overheat; and though temperature herein is necessary, yet a certain degree of heat must be attained, before it is in proper condition for the dyer's use. This is easily distinguished by a change of smell—from that which is most putrid and offensive, to one which is more agreeable and sweet, (if I may be allowed the term,) for few people at first either can approve of the smell of woad, or of a woad vat; though, when in condition, they become quite agreeable to those whose business it is to attend them. Woad is in this state of fermentation more or less time, according to the season and the degree of heat it is suffered to attain, whether at an early period, or according to the opinion of those who attend the process; but the best woad is produced from a heat temperately brought forward in the couch until at maturity, and turned, (on every occasion necessary,) which a proper degree of attention will soon discover.

These balls, when dry, are very hard and compact, and require to be broken to pieces with a mallet, and put into a heap, and watered to a due degree, only sufficient to promote fermentation, but not by too much moisture, which would retard it; and here is a crisis necessary to be attended to. When the couch has attained its due point, it is opened, spread, and turned, until regularly cooled, and then it is considered in condition for sale: but the immediate use of woad new from the couch is not advised by dyers who are experienced; for new woad is not so regular in its fermentation in the blue vat. This is the common process. Woad oftentimes is spoiled herein, by people who know nothing of the principles of its dye, following only their accustomed process of preparing it; and hence the difference in its quality is as often seen, as it is in the real richness or poverty of the leaves, from the quality of the land. The process for preparing woad

which I have followed, and which I consider beyond all comparison best, is as follows:

Gather the leaves, put them to dry, and turn them, so as not to let them heat, and so be reduced to a paste; which, in fine weather, children can do. In wet weather, my method was to carry them to my stove, and when I had got a quantity sufficiently dry, I proceeded to the couch, and there put them in a large heap; where, if not too dry, they would soon begin to ferment and heat. If too wet, they would rot, but not properly ferment, nor readily become in condition for the dyer. These leaves not having been ground, nor placed in balls on the hurdles, their fermenting quality was more active, and required more attention; and also the application of lime occasionally to regulate the process with the same kind of judgment as used in the blue dying woad vat. When the heat increases too rapidly, turning is indispensably necessary, and the application of very fine flour lime regularly strewed over every laying of them; or, if the couch is getting too dry, lime-water instead of common water, applied by a gardener's watering-pot, may have an equal effect,* without loading the woad with the gross matter of the lime; though I conceive that the gross dry flour lime, and the oxygen in the air, will furnish more carbonic acid gas to the woad, and retain such principles as are essential, to a better effect. For I have experienced, that woad which requires the most lime to preserve a temperate degree of fermentation, and takes most time, is best, so that at length it comes to that heat which is indispensable to the production of good woad.

In this couch it is always particularly necessary to secure the surface as soon as the leaves begin to be reduced to a paste, by rendering it as smooth as possible, and free from cracks: this prevents the escape of much carbonic acid gas, (which is furnished by the lime and the fermentation,) and also preserves it from the fly, maggots, and worms, which often are seen in those parts

* There is in lime-water so little of its salt, that its effect is proportionably small, and water will take up but a certain quantity.

where the heat is not so great, or the lime in sufficient quantity to destroy them; it is surprising to observe what a degree of heat they will bear. This attention to rendering the surface of the couch even and compact is equally necessary in either process, and to turning the woad exactly as a dung-heap, digging perpendicularly to the bottom. The couching-house should have an even floor, of stone or brick, and the walls the same; and every part of the couch of woad should be beaten with the shovel, and trodden, to render it as compact as possible.

The grower of woad should erect a long shed in the centre of his land, facing the south, the ground lying on a descent, so as to admit the sun to the back part; and here the woad should be put down as gathered, and spread thin at one end, keeping children to turn it towards the other end. In the course of a week, every day's gathering will be dry for the couch, which should be at the other end; therefore it will be necessary to calculate how long the shed should be; but this can be erected as you gather, and then it will soon be known.

I never used the thermometer to discover or determine the heat which is necessary to produce that change of smell which finishes a couch of woad properly for the dyer,* but I am convinced it cannot be regularly obtained but by temperance and time.

Good woad, such as the richest land produces, if properly prepared, will be of a blackish green, and mouldy; and when small lumps are pulled asunder, the fracture and fibres are brown; and these fibres will draw apart like small threads, and the more stringy they are, and the darker the external appearance and on the green hue, the better the woad; but poor land produces it of a light-brownish green. The fibres only serve to show that it has not suffered by putrefaction.

Considerable fortunes have been acquired by the culture of woad in the North of England, and those who have not in possession land sufficient of proper staple, will give an extra rent for leave to break pasturage; and such as is old, and its sod worn

* I suppose from 100 to 120 degrees.

out and full of ant-hills from long feeding, is equally good, when lime is applied to destroy these and other insects, which here exist more than in such as is in full proof to bear grass; for here they generate and become destructive, so as often to render it very necessary to plough such land, corn it, and form a new turf; and though this is so often prohibited, yet it is often consistent with the best principles of husbandry. Here woad is every thing, and corn after it to a certain degree, which experience will determine, according to the kind of land. Those who grow woad in large quantities, have moveable huts for their work-people; and also all their apparatus so easily put together, as to be of little expense except in carriage.

A friend of mine in London took a large quantity of land whereon had been wood just grubbed up. He planted woad on it, and engaged a person from the North to manage it; and the produce was so abundant as to afford immense profit. I believe he only woaded two years, and then let it. His tenant's produce did not by any means equal his, because the land began to want change. I know not how he succeeds in corn, but I presume he did well, as it is a fine preparative for it.

FIORIN GRASS.

AS mentioned in Archives, vol. 2. p. 268, this grass has been found native. Mr. John Clifford of Philadelphia county, who has the imported grass growing with great luxuriance, found the native grass in abundance in a lane in his vicinity. The Editor also found it in July last, at Saratoga Springs in New-York; and the Hon. Mr. Peters, Pres. Phila. Agric. Soc., lately showed the plant to him in a small brook running through his farm. Mr. Peters has also the imported grass growing from some stolones planted in June last; and to prove its extreme hardiness and strong vegetative power, it may be mentioned that the plants had been wet with salt water on the voyage. They had not the least appearance of life when put into the ground. Fiorin may therefore be considered as secured to the United States.

ACCOUNT OF SUBTERRANEOUS CULTURE IN PARIS.

Communicated to the Editor, by M. COREA DE SERRA.

IT is well known that the species of mushroom called by the botanists *Agaricus campestris*, and by the French *Champignon*, of which a great use is made in European cookery, is an object of culture both in England and France. Couches of a proper compost, and manured in a peculiar way, are prepared to receive the white substance which the English call mushroom spawn, and the French, Blanc de Champignon; and these couches are covered by shadings generally made of rye straw, in order to imitate the process of nature, which has allowed shady and moist places for the growth of these plants. In a few days the little mushrooms begin to appear; and when of proper size, they are gathered and sent to market. Light and dryness are their enemy, and a constant attention is bestowed by gardeners to defend them from the effects of both.

A gardener and nurseryman of Paris, whose garden is situated between the Barriere St. Jacques, and the Barriere de la Santè, on the east side of the Observatory, has very ably and ingeniously taken advantage of one of the immense and deep subterraneous quarries, from which the calcareous stone used in the construction of the houses of that vast capital, have been taken; and there, at the depth of at least fifty feet under ground, he practices on a large scale the culture of this mushroom. The opening of the quarry is situated in his garden; two ladders, (because the excavation has two floors), are the means of communication with this subterraneous garden and that above; all the area of the meanderings and extensive galleries of this quarry, which is considerable, are covered with proper compost, and properly manured, except a narrow path in the middle; and the mushroom spawn is put there as in the ordinary culture, and as neither light nor dryness are to be feared in such a place, and a constant equal temperature is felt at that depth, no other care of them is required, but to observe their growth in order to gather them. In winter and the autumn, he has the competition of other gardeners and country people, but in the spring and summer he is almost

the sole vender to the Paris market, because he can sell them cheaper than others could do. He needs not, from the singular nature of his plantation, bestow any of the particular attentions the others are obliged to give, nor is he exposed to have his crops suddenly destroyed by thunder storms, as constant observation has shown to be the case of mushrooms exposed to the atmosphere, though shaded. His concern in this cultivation is of some importance, since according to his account, which seems far from exaggerated, he sells commonly in a year for about twelve hundred dollars of mushrooms, from which we must deduct somewhat above six hundred dollars of the expenses of this singular cultivation, which is all performed by candle light.

Another more common subterraneous culture, is that of the sallad which the French call *Barbe de Capucin*, and which is by far one of the most sightly and palatable that appears on a table. Roots of wild chicory (*Cichorium intybus*), are deprived of all their leaves, disposed on layers covered with sandy earth, on shelves in a case, far from light. There they expand new radical leaves, but produce no stem. These leaves come to an unusual length, are perfectly discoloured or of a yellowish white, succulent, tender, and of a sweet taste when compared to the original bitterness of the wild chicory, but still retaining a weak degree of it, which prevents their tasting mawkish. The bundles of this sallad still adhering to the roots, grace during some months the stalls of the Parisian markets, and the green grocer's shops of that metropolis.

EULOGIUM ON MR. BILLINGSLEY.

The following energetic and impassioned tribute to the memory of an eminent British agriculturist, and a highly respectable man, the late Mr. Billingsley, was delivered by *Benjamin Hobhouse, esq.* President of the Bath and West of England Society, at the last annual meeting on the 17th December 1811.

"THE moment is arrived, Gentlemen, when we are called upon to exercise a sad and painful office:—we are seeking to obtain a good resemblance of our late much-lamented Vice-President, Mr. BILLINGSLEY; and we are now to determine whether a Bust or Portrait will best answer the melancholy, but, at the

same time, in some degree consolatory purpose. At our last Anniversary, we had the pleasure, the delight, I may say, of seeing this most estimable and amiable man amongst us; but "the eye which hath seen him, shall see him no more." Rare and extraordinary were his talents: Nature had endowed him with a powerful and vigorous understanding, which it was his anxious and unremitting endeavour to enrich with knowledge. In the early part of his life his attention was given to the Woollen Manufacture, but after a few years he was determined to abandon that employment. Let me not be understood, Gentlemen, to undervalue the pursuit of the Manufacturer, when I state it as a matter of joy that Mr. Billingsley's talents were finally diverted into another course. The occupation of a manufacturer is great and important in society; but at the period when Mr. Billingsley quitted that destination, a field of greater usefulness was open to him; a department more congenial to his taste invited his entrance. It is notorious, that the Agriculture of this country, whether owing to our insular situation, or to the superior activity of our tradesmen and merchants over the tillers of the earth, or to any other cause or causes, had not advanced with the same rapidity as our manufactures and commerce. It might have been said of this kingdom, previously to the establishment of this Society, which was founded in 1777, that the principles of Agriculture were but little understood; that the implements of husbandry were in a very rude condition; and that the live stock of the Farmer was far distant indeed from that perfection, which it has since attained. This was the degraded state of Agriculture, at the period when Mr. Billingsley, aided by a few other congenial and public-spirited individuals, applied his powerful understanding to its improvement; and the means which he adopted were well calculated for the attainment of that most desirable end.—Aware that the true system of philosophizing is founded on facts, he had recourse to experiments; and he conducted them with all that care and attention, without which they cannot be productive of the smallest degree of utility. With the result of one or two trials he was not contented; he often, very often, repeated the same experiment; and if the result were invariably

the same, he then, and not before, ventured to draw his conclusion. His successful exertions we have all witnessed; and we all know how liberal he was in communicating his knowledge, and in how able and forcible manner he conveyed it. I am persuaded, Gentlemen, you will all agree with me, that the death of such a man is a great national misfortune. The numerous prize compositions of Mr. Billingsley, which through the volumes of our transactions have found their way to the public eye; and his agricultural survey of the county of Somerset, approved and printed by the board of Agriculture; cannot but excite universal regret that this intellect has for ever ceased to shine, and that from this once abundant source of information no stream can longer flow. But still the portion of affliction which falls upon this society, is the heaviest. We not only feel in common with the nation and the world, for the loss of one who might have continued to spread knowledge for the benefit of mankind; but having had the advantage of deriving wisdom from his lips, we have to lament, that cold is the tongue which gave life and animation to our discussions. Having a mind stored with knowledge, in the application of which he was peculiarly prompt and happy, no question could be brought under consideration, upon which he had no power to enter. When points of intricacy have been started, has he not, by the strength of his reasoning powers, stripped them of all their difficulties? His investigating mind was never satisfied with taking one view only of a subject; he examined it on all sides with accuteness and penetration, and never ceased to sift it, until the course fit to be pursued was rendered plain and easy. In a word, the death of Mr. Billingsley has inflicted a severe and lasting wound in the bosom of this society, whose interests were peculiarly dear to his heart, and to the advancement of whose prosperity the great bent of his genius was principally directed.

"Hitherto, Gentlemen, I have only adverted to the talents of Mr. Billingsley. To detail his virtues would be impossible; and indeed it is unnecessary, as they are so well known to you. His ruling passion was the love of mankind. He could not hear a

distressing fact, without shedding tears; and the suffering which he bewailed, he always sought to relieve. This I, who being distinguished by his friendship, have still further cause for sorsow, who admired, revered, and loved him, can truly testify. In confirmation of my correctness, I appeal to the many around me, who had the honour of being intimately acquainted with him. His desire to promote the happiness of mankind was evinced in the whole course of his life. To heal differences, and restore harmony, was the favourite pursuit of his mind. Judge, then, how his heart must have been rent by the disputes and litigation in which, towards the close of his life, he was unhappily involved. The immediate cause of his dissolution was, perhaps, that sensibility of mind which so strongly marked his character. I shall not enter into any of the particulars of those unfortunate differences, nor would it be fitting here to pronounce any opinion on the subject. Suffice it to say, that had it pleased the Great Disposer of all events to have spared his life for a few days only, he would have seen that innocence, of which he was proudly conscious, clearly established, and that integrity, which he valued more than life, firmly upheld by the unanimous award of the arbitrators, to whom the final adjustment of the matters in litigation was committed. But such was not the will of Heaven; and to the dispensation of Providence, however unsearchable by us, it is the duty of man to submit with implicit resignation, from a conviction, that under the superintendance and controul of unerring wisdom and perfect benevolence, "whatever is, is right."

"During the short time which I have painfully employed in paying this last tribute due to the memory of my departed friend, our late excellent Vice President, I have perceived that your emotions were in unison with mine; and that you felt it impossible to suppress the throbs which agitated your bosoms. Such bursts of overwhelming sorrow are far more valuable testimonials of the merit of him, whom the Divine Being has thought fit to remove to another and to a better world, than "the pomp and circumstance" of funeral procession. His virtues are embalmed in your hearts; may the remembrance of them be manifest in your lives!"

PAPERS ON THE USEFUL ARTS.

METHOD OF PREPARING A CHEAP AND DURABLE STUCCO, OR PLASTER, FOR OUTSIDE WALLS.

By H. B. WAY, *of Bridgeport Harbour.**

THREE parts of Bridgeport Harbour sand, to one of lime, both finely sifted, and mixed with lime-water; if used as stucco, the first coat to be laid on half the thickness of a crown-piece: let it remain two days, then with a painter's brush wash it over with strong lime-water, and lay on the second coat of the same thickness. A coal half-bushel of lime, was put into a hogshead of water, to make the lime-water; to two coal half-bushels more of lime, slacked and sifted, which then measured three half-bushels, were added nine half-bushels of sand sifted, and well mixed with lime-water; the next day it was again mixed up, that it might be well incorporated. The coal half-bushel contained exactly thirteen gallons of water, wine measure, and would exactly hold 1 Cwt. 1 qr. 7 lb. nett of the sand used.

Mr. Way says that his house is greatly exposed to the spray of the sea, and that by means of the stucco prepared according to his receipt, it is perfectly free from damp, and that the plaster remains (April 1811,) compact and durable. The work was done in March 1805.

REMARKS.

It is commonly believed, that plaster made with sea-sand, unless well washed with water, would be always damp, but Mr. Way found from what had been done in his dining parlour and passage, that it was always dry, although the whole of the sand

* Abridged from Trans. of Soc. for the encouragement of Arts, Manufactures, and Commerce, for 1811. London.

with which it was done, had been thrown up by the sea, and must have been always at spring tides, covered with sea water.

The following facts show that mortar very freely impregnated with sea salt, is even improved thereby.

Mr. Somerville was informed by the Earl of Wemyss, "that in completing a line of enclosure upon his estates, on the south side of the Frith of Forth, he was under the necessity of using salt water, not only for slacking the lime, but for bringing it to the consistence of mortar, after it was mixed with sand. Contrary to all expectation, the work done with the salt water, took band sooner than what was done with fresh water, and continues firm."*

The Editor has heard that a similar agreeable disappointment was experienced by a gentleman near the sea coast, in Jamaica, from the use of salt water in making mortar. The extraordinary solidity of the *Tabby* or Tapia walls of S. Carolina and Georgia, made of shells, shell lime and sand, also, may arise from the salt attached to the shells and sand. See article *House*, Domestic Encyclopædia, Philadelphia Edition.

ON LIGHT, &c.

BY COUNT RUMFORD.

Extract of a letter to the Editor, from R. R. LIVINGSTON, *Esq.*

NEW YORK, March 24, 1812.

TO change the subject to one more interesting to you, I have received from my friend Count Rumford, a very long, and very pleasing letter. This he accompanies with two pamphlets on light, as applied to domestic uses—and another on broad-wheels for carriages, both of pleasure and labour. As the two first have been printed as he tells me, merely to give away to his friends,

* Trans. Board Agric. London, Vol. 2d, p. 71.

they will not appear except in the proceedings of the Royal Society and the National Institute. I have therefore read them to our Society for Useful Arts, in whose journal they will appear.

After noticing the different theories of light, he adheres to that which supposes light not to form a part of the luminous body, but to be a vibration in the ether analogous to the vibration and undulation in the air that produces sound. If so, we must seek for the light which a flame produces in a high temperature of the different particles of matter which compose the flame; these particles will be luminous in the same manner as red-hot iron, and they will disappear whenever they are cooled to such a degree, as no longer to excite the vibration which operate upon the eye. If this hypothesis is just, it must follow, that the quantity of light will not bear an exact proportion to the inflammable matter consumed, because the volume and form of the flame, must necessarily have considerable influence upon the time it takes to cool. To show that this is really the case, he subjects the theory to several very interesting experiments.—He divides his photometre into degrees, which indicate, without any calculation, the relative intensities of two lights; a wax candle of 5 to the pound, having nine lines diameter, and ten and a half inches height, is his standard of light. The light of this, he calls 100°, and he divides into 100 parts, the quantity of wax burnt by this candle in an hour. His object was to determine, whether the quantity of light in a combustible body, was always proportioned to that of the body consumed. Argand's lamp, when quite clean, and burning purified oil, burns without smell or smoke. This was employed to determine the above question.

This was placed before the photometre and so regulated for thirty minutes as to give 100° of light, (the same as that furnished by the candle) at the end of the experiment, the lamp was extinguished. The result was that 228 parts of oil produced 100° of light, or in other words, 100 parts of oil gave only 48 of light, while the candle gave 100° of light for 100 parts of wax.

The lamp was again cleaned and lighted so as to produce

200° of light; in this experiment, 100 parts of oil gave 74° of light.

In a third experiment, the lamp was made to give 300° of light; the result was 98° of light for 100 of oil.

In the fourth experiment, the lamp was raised so as to give 400 of light, when it gave 112° of light for 100 of oil. In this experiment, a given quantity of oil, gave more light than the same quantity of wax. These experiments were continued through various grades, and it was always found, that the proportion of light to the oil consumed, was greater as the light was more intense.—Thus, when the light was 900°, the proportion of light to the oil consumed, was as 160° to 100 of oil consumed. That the difference of light, between the first and last experiments, was four to one, in favour of the greater light.

These experiments are very important in two views: 1. As they shew that more light can be obtained from oil, than from the same weight of wax—and next, that the quantity of light may be greatly œconomised by the form of the lamp. A variety of other experiments were made, which fully proved that a small flame, whatever be its form, gives much less light than a larger one in proportion to the oil consumed. The same experiments were repeated, with the same results, upon wax candles, and when the candle was extremely small, as a watch light, the proportion of light, was to the wax consumed, between that and the taper above described, as one is to sixteen—evidently because in this case, (if we admit his hypothesis) the particles of which the small flame was composed, cooled too soon to operate upon the eye with necessary force, and yet the wax consumed, proved that the combustion of both tapers was in proportion to each other, and so as appears by his farther experiments was the heat envolved, and which passed off in the current of air above the candle. From these premises he adduces, and I think fairly, that light is not a substance more than sound, and that any search after it, as a component part of bodies is idle. The whole pamphlet is very interesting. The second reduces his principle to practice in the invention of a variety of lamps, both portable and

stationary, which are now in use in Paris, and for which I shall write so soon as a safe means of conveyance offers. He tells me in his letter, that he has found the means of encreasing the light for light-houses to any given extent. You know how much this is wanted, and how vainly it has been attempted. He is now, he says, occupied in determining the quantity of heat produced in the complete combustion of wood of various kinds. These researches, like those of most American philosophers, are directed not to barren science, but to the most useful and important œconomical subjects.

The experiments on broad-wheels, are also very ingenious, and to me conclusive in their favour, but you will readily excuse, considering the length of this and its enclosures, my not entering upon them at present.

On the subject of salt, which you say you have noticed in your Archives, there is a remarkable fact, which is not, I believe, generally known: that is, that the salt itself is evaporated by rapid boiling. In the boiler of steam engine, tho' a vast quantity of salt water is evaporated, not a particle of salt is ever found. The condensed steam, however, when it comes in contact with the air, yields it in considerable quantities.

I am with much esteem,
Dear Sir,
Your most ob'dt. humble ser'vt,
ROBERT R. LIVINGSTON.

Dr. James Mease.

For the Archives of Useful Knowledge.

DESCRIPTION OF A METHOD OF LIFTING FORGE HAMMERS, OR STAMPERS FOR RICE, PLASTER OF PARIS, &c. WITHOUT NOISE OR PERCUSSION.

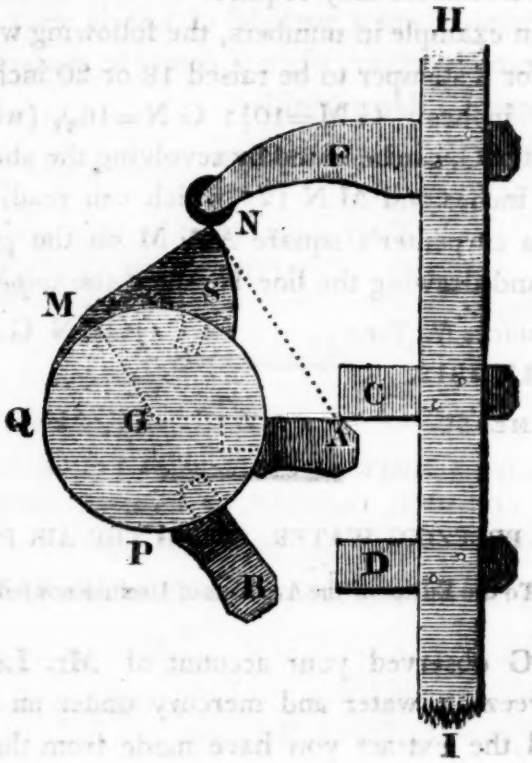
By Mr. JOHN GARNETT, *of New Brunswick, N. Jersey.*

WHEN heavy stampers are to be raised, in order to drop on the matters to be pounded, a stroke or percussion is given, that shakes the supporting frame, deranges in a little time the machi

nery, and causes that deafning noise from stamping and fulling-mills heard at a considerable distance.

To remedy this, I have used with success, the following method, which first overcomes the vis inertiæ of the stampers, by *gradual acceleration*, until the required velocity is attained, and then continues this velocity *uniformly* to any required height of the stamper. Thus,

Let H I be a stamper in a vertical position, on which are fixed the spurs C, D, and *slider* or *sheeve* N. G P Q the section of a shaft or barrel, placed horizontally to lift the stamper by means of a wiper M N S lifting the slides F N, and teeth and tappets A B, acting on the spurs C, D; for as the barrel G revolves, the slider or sheeve N will slide or roll along the plane M N to the point N, where it will have given the stamper H I the *precise vertical velocity* of the pitch line of the teeth or tappets A B on the barrel; these teeth will then continue the velocity to any required height, according to their number and pitch.



To construct the Wiper M N S.

From the point G the center of the shaft, and A the pitch point of the first tooth or tappet draw any two parallel lines G M, A N, but not exceeding 30 degrees from the vertical, or making the angle G A N not less than 60 degrees; then any convenient line M N at right angles to, and joining these parallel lines, will give the length and position of the *wiper*.

Or a workman may be directed to place a carpenter's common iron square A N M on the point A, the pitch of the first tooth, at an elevation of not more than 30 degress from the vertical (G A being horizontal) then the part N M of the square will mark the required wiper. It is easy to demonstrate, (and may be a neat problem for some of your mechanical correspondents) that the point N of the wiper will give the same vertical velocity to the stamper H I as the pitch line of the teeth or tappets. The wiper may be in the same or a different plane from the teeth A B, as circumstances may require.

To give an example in numbers, the following would be found convenient for a stamper to be raised 18 or 20 inches :—

G A=14 inches; G M=$10\frac{1}{2}$; G N=$16\frac{1}{13}$ (which distances from the center G, can be found by revolving the shaft) then A N will be $17\frac{1}{2}$ inches and M N $12\frac{3}{8}$ which can readily be marked by placing a carpenter's square A N M on the point A to N $17\frac{1}{2}$ inches and drawing the line N M on the *wiper*.

New Brunswick, N. Jersey, JOHN GARNETT.
June 11, 1812.

DR. JAMES MEASE.

ON FREEZING WATER, UNDER THE AIR PUMP.

To the Editor of the Archives of Useful Knowledge.

SIR,

HAVING observed your account of Mr. Leslie's experiments in freezing water and mercury under an exhausted receiver; and the extract you have made from the Millwright's

Guide, published in Philadelphia, 1795; I beg leave to draw your attention to the three last pages of "The Abortion of the Young Steam Engineer's Guide," published in 1805. There you may see Mr. Leslie's discoveries anticipated in a greater degree. The principles and the machine there described, have long since been specified as the law requires, in the Patent-office of the United States, in order to take out a patent for the discovery, as soon as it shall be the interest of the discoverer to do so.

Another machine for producing cold, is also specified in the said office, to operate on principles seemingly opposite to the first: *viz.* a machine for condensing air to a greater degree in a strong metallic vessel immersed in water, or kept wet with water or other more volatile fluid to promote evaporation. The heat which the air contained, is thus squeezed out, and escapes through the metallic vessel into the water, or is carried off by evaporation.

This condensed air *robbed of its latent heat*, is to be permitted to escape, carrying a portion of water with it in the form of mist, into another vessel that will expand to receive it. The air expanded will need its portion of latent heat again, and it will rob the water of its latent heat, and freeze it into ice or snow.

OLIVER EVANS.

Phila. Aug. 2, 1812.

DR. JAMES MEASE.

LAW DECISION ON A PATENT RIGHT.

Communicated for the Archives, by one of the counsel.

DAWSON *versus* FOLLIN.

THIS was an action brought in the Circuit Court of the United States, for the Pennsylvania district to the April Session 1807, against the defendant, for nfringing the plaintiff's patent, securing to him a discovery and improvement in the manufacture of Suspenders. The schedule referred to in the letters patent, descri-

bed the improvement in the following terms :—" The suspenders are made of cotton, silk, leather, or other fit materials, and the springs in the usual form of the cat-gut springs. The web is attached to the front springs by means of two square eyes, and to the back springs by two clasps, with two buttons to each clasp. The web by means of two sliding clasps, without points, is moveable on the front eyes, and may be lengthened or shortened at pleasure, and when so lengthened or shortened, will remain in the situation placed, without the inconveniences attendant on the buckle in common use. The two clasps fixed to the back springs by means of the eyes, will permit the web to be detached from the springs, and also from the front square eyes, so that the web may without any inconvenience to the suspenders, be washed at pleasure, and by having two sets of webs, they may be kept clean and in a state agreeable to the wearer. The great advantages which these suspenders possess over those made in the common form, are the following: 1st. In the method of shortening, and lengthening them, by which the web is not cut with the points of the buckles. 2nd. The easy mode of detaching the web from the springs, for the purpose of washing or renewal."

The declaration contained three counts. The two first with some variation charged the defendant with *using* and *vending* the improvement, and the third count with *using part* of the improvement only. To this declaration the defendant pleaded the general issue, and under the 6th section of the act of congress, of 21st February 1793, served the plaintiff's council with the following notice.

"Sir,

"Take notice that the defendant in the above action, will give in evidence under the general issue in the said action, that the thing secured, or intended to be secured by the plaintiff's patent, was not originally discovered by the said plaintiff, but had been in use anterior to his supposed discovery." *For def'dt.*

The plaintiff grounded his action on his patent, which he contended, secured to him for a limited time, the exclusive right to

make and vend his improved suspenders, and that he was the inventor of the new mode of making suspenders, which in practice would be found a highly useful improvement. The patent to which the foregoing specification was annexed, issued under the authority of the act of congress, entitled "An act to promote the progress of the useful arts, and to repeal the act heretofore made for this purpose," passed February 21, 1793, vol. 2, page 200. The 1st section of the law gives the right to take out a patent to *citizens* of the United States only, "who have invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter not known or used before the application." This right by a subsequent law, passed the 17th of April, 1800, is extended to all aliens who have resided two years in the United States. The 6th section of the act of 1793, provides, "that the defendant in such action, shall be permitted to plead the general issue, and give this act and any special matter, (of which notice in writing may have been given to the plaintiff or his attorney, thirty days before trial), in evidence tending to prove that the specification, filed by the plaintiff, does not contain the whole truth, relative to his discovery, or that it contains more than is necessary to produce the described effect, which concealment or addition, shall fully appear to have been made for the purpose of deceiving the public, or that the thing thus secured by patent, was not originally discovered by the patentee, but had been in use, or had been described in some public work anterior to the supposed discovery of the patentee, or that he had surreptitiously obtained a patent for the discovery of another person; in either of which cases, judgment shall be rendered for the defendant with costs, and the patent shall be declared to be void."

The evidence on both sides was voluminous, tending to maintain the pretensions of the respective parties. It is not necessary here to detail it, as it was left to the Jury as the proper tribunal to decide on its weight and credibility. On the construction of the two acts of February 1793, and April 1800, a question of much importance was agitated and discussed at some length, by the

counsel concerned; whether in case the discovery should be deemed an improvement within the terms of the law, and the plaintiff considered fairly and justly the inventor of the improvement; yet, if without his knowledge, it had been known and used in a foreign country, he would be entitled to a patent from the United States? Judge Washington charged the jury particularly to this point, and went into a detailed view of both the acts of Congress, and stated it to be the best result of his opinion, that the acts did not secure to the *American inventors*, any exclusive rights, where the discovery for which they claimed a patent, was known and used (although without their knowledge) in a foreign country. The law of April, 1800, confirmed him in the opinion of the propriety of this construction. In the first section, aliens for whose benefit it was passed, are required to make oath, that the invention, art, or discovery, hath not to the best of their knowledge or belief, been known or used in *this* or any *foreign country*. The latter part of the oath is not required by citizens, for obvious reasons; but if congress had not considered the general expressions in the first section of the act of 1793, "*not known or used before the application*," extending as well to other countries as to the United States, they would not have required this additional sanction from foreigners. In England, patents are obtained under their statute of 21 James I., called the "statute of monopolies." It secures the rights to *inventors*, although the discoveries they may make, may at the time be known and used in foreign countries.* But this is in virtue of the particular wording of their statute, which is very different from the acts of congress before mentioned.

The jury found a vedict for the defendant. The counsel for the plaintiff were Moses Levy and John Read; for the defendant Messrs. Ingersoll and Duponceau.

* And this is one reason why *England is the depot of the genius of all Europe and the United States.* EDITOR.

AROMATIC SPIRIT OF VINEGAR.

THIS agreeable and pungent liquid was invented about 16 years ago by Mr. Henry, of Manchester, England. It is composed of highly concentrated vinegar, joined with the most pleasant aromatics, and may be kept unimpaired in any climate, and for any length of time. By its pungent odour, it affords relief in head-achs, and faintings; and is rendered peculiarly grateful and refreshing in crowded rooms, and in the apartments of the sick.

Many attempts have been made to imitate this vinegar, and in answer to a question in the London Monthly Magazine, as to the best way of preparing it, the following methods are given in in the No. of that work for August, 1812.

1. Pour a small quantity of concentrated sulphuric acid on the acetate of copper, (or common verdigris), the acetic acid will be plentifully disengaged, and if kept from the atmosphere will preserve its pungency for some time. By distillation at a moderate heat, the acetic acid may be procured very pure from the compound, which when scented with an odorous oil, may not prove an unpleasant substitute for the real "Henry's."

2. The method I have adopted, (says the writer) and always with success, has been to take *sal diureticus*, (acetate of postash) and to add to it gradually about half its weight of sulphuric acid; the mixture may be made in a smelling bottle. If a drop or two of bergamot, or oil of lavender, be afterwards introduced, it will constitute the present and well known perfume of aromatic vinegar.

TO MAKE RED INK THAT WILL NOT CHANGE ITS COLOUR.*

TAKE four grains of the best carmine, and pour thereon two ounces of caustic ammonia, adding twenty grains of the clearest gum arabic; let them remain until the gum is dissolved. This ink, however it may be something dearer than in the ordinary

* Tradesman, July, 1810.

way of its preparation, is of much finer colour and more durable: for by experience it is known that characters which have been traced with this ink, have remained perfectly fresh for forty years afterward.

RECENT AMERICAN INVENTIONS AND IMPROVEMENTS.

1. FILE AND SICKLE CUTTER.

MR. M. B. BELKNAP, of Worcester, Massachusetts, announces a machine for cutting Files and Sickles. It is not liable to get out of order; will cut files coarse or fine, or of any shape. One machine, with good attention, will cut from five to six dozens of 12 inch files per day. Purchasers of rights to use the machine, will be furnished with a set of machines consisting of three, calculated for cutting sickles, and the patentee will put the same in operation for him, give instructions in the art of hardening, so that the files shall have the neat appearance of the best English manufactures.

Files are now made on a large scale in Philadelphia.

2. PORTABLE WOOL SPINNERS.

THE Rev. Burgis Allison, of Philadelphia, has invented a portable machine for spinning wool, adapted to the use of private families; it is simple, and takes up but a little more room than a common wool spinning wheel. They may be constructed to drive from 10 to 15 spindles, and set to spin the yarn to any degree of fineness admitted by the wool.

Portable Spinning Billies, for wool, to carry 12 spindles, are also made by Joseph Bamford, No. 5, Filbert-street, Philadelphia, for $48. These billies spin 14 cuts to the pound, and by spinning a second time, they will turn out 20 cuts to the pound. He also makes machinery for cotton, wool, and flax for large manufactories.

3. Mill stones from the Georgia Burrs, (noticed in Vol. 2d p. 382), are now manufactured by Oliver Evans, Philadelphia,

extensively. The quality of the stone improves, the deeper the quarry is opened.

4. Messrs. Samuel B. Hitchcock and John Bennet, of Concord, (N. H.), have invented a method of pegging boots and shoes, which not only expedites the work, and relieves the workman from the necessity of sitting bent forward and drawing the wax end, by the strength of the arms, but also renders the work neater and more durable. This mode is now practised in New York, and very generally in Connecticut. The Editor has seen those pegged shoes, and can attest their neatness and durability.

A LIST OF THE NAMES OF PERSONS TO WHOM PATENTS HAVE BEEN ISSUED FROM THE TWENTY-EIGHTH OF DECEMBER, 1810, TO THE FIRST OF JANUARY, 1812.

(Continued from p. 104.)

Inventions in 1811.

James W. Walker, of Wilmington, North Carolina, a threshing machine, February 9.

Samuel Bacon, of Lanesborough, Massachusetts, a steam still, February 9.

Jonathan Elliot, of Newbury, Essex county, Massachusetts, an elevator for the use of the sick, February 15.

Stephen Belknap and Samuel Merrill, of Georgetown, Washington, D., a descending saw mill, February 15.

William Beach, of Franklin, Delaware county, New-York, in the double forcing pump, February 19.

Salmon Fuller, of Clark county, Indiana Territory, in propelling boats and vessels by horses, February 19.

Thomas Ferris, of Duchess county, New York, in the double forcing pump, February 20.

Thomas Paul, of Baltimore, a mode of producing what he calls Columbian oil, February 23.

Robert Lloyd Nicolls, of Easton, Talbot county, Maryland, a mode of preserving and defending wood immersed in salt water,

from the attacks or injuries of that species of worms which is generally found destructive at sea, &c., February 23.

James Stubbs and Nathaniel Parsons, of Chilicothe, Ross county, Ohio, in the steam engine called the vaporeun machine, February 25.

Miles H. Abbot, in the saw mill, February 26.

John Comfort, of Bucks county, Pennsylvania, for cutting and gathering grain and grass, February 26.

John Sweet, of Berkshire, Massachusetts, in andirons and fire places, February 26.

Elisha Perkins, of Shrewsbury, Monmouth county, N. J., in making flour, starch, and spirit, from wheat or other vegetable matter, February 26.

Ezra Willmarth, of Rumney, Grafton, Massachusetts, for shearing cloth, February 28.

William Pond, of Wrentham, Norfolk county, Mass., in manufacturing straw wove platt, February 28.

Joseph Goulding, of Leicester, Massachusetts, machine for cutting felloes for wheels, February 28.

Do. of do., in the forge and trip hammer, March 1.

Do. of do., in mills, March 1.

Townsend Cock, of New York, in training and breaking horses, March 1.

Robert Hancock, sen. and Edward W. Carr, of Philadelphia, a machine for cutting wooden screws, &c. *(a)* March 1.

Otis Paine, of Foxborough, Norfolk, Massachusetts, reverting wheels for various purposes, March 1.

Noel Blanche, of New-York, in the condensation of vapours in distillation, March 2.

Dexter Wheeler, of Bristol, Massachusetts, a tide mill wheel, March 2.

William Watson, of Weymouth, Gloucester county, N. J., in the stove, March 2.

(a) This is now in actual operation in Philadelphia.

Nehemiah Price, of Frederick county, Maryland, a machine for rubbing out clover, March 2.

Azael Pierson, of Cumberland county, New Jersey, in chain paddles for propelling boats, *(a)*, March 2.

Sherman Dewey, of Hartford, Vermont, a machine for hulling rice, March 2.

Benjamin Cummings, of Palmer, Hampshire county, Mass., for shearing cloth, March 2.

William Sheldon, jun. of Springfield, Massachusetts, in the application of slate to various uses, March 2.

Jacob Miller, of Lancaster county, Pennsylvania, in distilling, March 2.

Barzillai Russell, of Harford, Connecticut, in warming rooms, *(b)*, March 4.

George C. Killogg, of New Harford, Litchfield, Connecticut, a machine for shearing cloth, March 4.

Thomas Mussy, of Philadelphia, a water loom, March 4.

Levi Gray, of Otsego county, New York, a reverse impelling pump, being a double forcing pump, March 7.

Israel Swan, of Haverhill, New Hampshire, in planking and felting hats, March 7.

Pliny Upham, of Brookfield, Worcester, Massachusetts, in the pump for raising water, March 9.

Samuel Randall, of Providence, Rhode Island, the subignis air draught, March 12.

George Neff, of Dauphin county, Pennsylvania, a machine for cutting sausage meat, &c., March 19.

Abraham Quincy, of Boston, a fire cavern, March 20.

(a) This is not yet applied to any use.

(b) Mr. Russell's contrivance is very simple, and economises fuel. By it a current of hot air, which in common chimneys ascends with the smoke, and is lost, is brought out above the mantle, and diffuses a pleasant warmth through the room. The principle of admitting hot air into rooms has been adopted in various ways for a century past; but Mr. Russell's mode is new, and certainly very effectual. It is in use at the Rev. Dr. Allison's, South Eighth-street, who is the agent of the patentee for Philadelphia. *Editor.*

Peter Sternberg, of Montgomery county, New York, in fire places, March 20.

Luther Gale, of Berkshire county, Massachusetts, a bark mill, March 20.

Daniel Van Voorhis, of Long Island, New York, a horizontal bellows wind wheel, which by reversing the wheel may be applied to water, March 21.

Lyman Cook, of Whitestown, Oneida county, New York, in the condenser, March 26.

Harry Mumford, of Ulster county, N. Y., a churn, March 28.

Rulef C. Van Houton, of New-York, a threshing machine, March 28.

Lyman Cook, of Whitestown, Oneida county, New York, in four-wheel carriages to be moved by manual labour, March 28.

John Boynton, of Windham county, Connecticut, for straining and grinding cards, March 30.

Cyrus Alger, of Boston, a mode of casting large iron rollers for rolling iron, &c., March 30.

Abiather Eastman, of Norway, Oxford county, Massachusetts, a nail machine for making wrought nails and spikes, or drawing small iron into any form, April 8.

William Baley, of Nelson county, Kentucky, a stave and shingle machine, April 10.

John Morgan, of Philadelphia, in the form of cossack boots, or rather in the mode of cutting leather for the formation of boots of every description, April 10.

Joseph Barker, of Deerfield, Oneida county, New York, in tanning leather, April 10.

Erastus V. Freeman, in making gin, April 10.

Jacocks Swain, H. Swain, and Joshua Swain, of Cape May court-house, in the lea board, April 10.

Oliver Evans, of Philadelphia, in saw mills,*(a)*, April 15.

Joseph Bernard, of Troy, New York, for vibrating nail plates while cutting, April 16.

(a) This is to regulate the feed of the saw, and is coming into use. *Editor*

William Gamble, of Washington City, Columbia District in distilleries and kitchen ranges, April 18.

Shubael Kimball, of Rhinebeck, Duchess county, New York, a lever purchase machine for propelling boats, working mills, &c., April 24. *(a)*.

John F. Randolph, of New York, a floating machine for supplying ships with fresh water, April 25.

Andrew Sherwood, of New York, in the kitchen stove, April 25.

Jeremiah Sibley, of New York, for cramping Suwarrow boot legs, April 25.

Andrew Sherwood, of New York, the drum cooking stove, April 25.

Benjamin Schoolfield and William Stanton, of Lynchburg, Campbell county, Virginia, in the spiral water wheel by balance gates, April 25.

Daniel Atherton, of Providence, Rhode Island, for trimming and pressing straw plait, April 26.

Edward Rumsey, of Christian county, Kentucky, a flax and hemp break, April 26.

Jesse Molleneux, of Hempstead, New York, for shearing cloth, April 30.

Eleazer Hovey, of Canaan, Columbia county, New York, a shearing machine, *(b)*, May 2.

Samuel Stone, of Enosburg, Franklin county, Vermont, for rasping or sawing dye woods, May 3.

Daniel Robinson, of Franklin, Delaware county, New York. a churn, May 3.

Andrew Dunlap, of Boston, in distilling, May 3.

Mark Andrews, of Kennebec, Mass., a mode of working a water wheel by raising and lowering it in a current or tide, May 4.

James Gregg, of New Hampshire, in manufacturing bricks. May 7.

(a) This plan has totally failed.

(b) The Editor saw this in operation: it shears one yard in a minute perfectly well. The manufactory of them is at New Lebanon, New York. *Editor*

John Rewey, of Berkshire, Broome county, New York, machine for cutting off the ends of bolts, &c., May 8.

Ebenezer Avery Lester, of Herkimer, New York, a vertical balance wheel nail-cutting machine, May 8.

Thomas Armat, of Philadelphia, for weighing hay, live cattle, &c., *(a)*, May 10.

Edward Gibson, of New York, in the bodies of carriages called the standing roof landau, May 10.

Ezra L. Miller, of Charleston, South Carolina, a writing instrument, May 11.

John James Jiraud, of Baltimore, a perpetual steam still, May 15.

John C. Johnston, of Fayette county, Kentucky, in breaking hemp and flax, May 16.

William Thornton and John Hatkill, of Washington City, in fire arms, May 21.

John Stephens, of New York, in constructing steam engines for propelling boats, May 21.

John Ballthrope, a spring for fastening window sashes, May 22.

David Dungan, of Upperville, Loudon county, Virginia, a washing machine, May 23.

Marshall Lewis, of Chenango, Broome county, New York, in saw mills, May 24.

Charles Woolverton and Benjamin Ridgway, jun'r. of Morris Villa, Pennsylvania, a machine for dressing mill stones, May 24.

Henry Burke, of Bucks county, Pennsylvania, in suspenders, &c., May 25.

Heman Palmerler, of Shoreham, Addison county, Pennsylvania, in the carding machine, May 25.

Joshua Witherle, of Boston, in cutting fur from peltry, May 28.

John Osborn, jun'r. of Litchfield, Connecticut, a horizontal water wheel, May 29.

Benjamin Wolcot, of Danbury, Huron county, Ohio, being a double suspender spring, May 29.

(a) This is in operation at Germantown, Philadelphia county. *Editor.*

Daniel Parker and John Sanford, of Sharon, Litchfield county, Connecticut, machine for shaving shingles, &c., May 30.

Vincent King and Jeremiah King, of Belleair, Harford county, Maryland, in working certain ores, May 30.

Joseph Ruggles, of New Milford, Litchfield county, Connecticut, a water blast, June 6.

Luther Bissel, of Ostego county, New York, in sawing and polishing marble, June 7.

Luke C. Hinman, Luther Bissel and Moses Barnes, of Ostego county, New York, a machine for moving two water wheels at the same time, May 7.

Harvy Bascom, of Weston, Massachusetts, a composition for mending china glass, &c., June 10.

William Stillman, of Westerly, Rhode Island, in shears for shearing woollen cloth, June 11.

Samuel Smith, of Herkimer county, New York, in the steam kitchen for baking, &c. &c., June 11.

Abner Ellis, of Dedham, Norfolk county, Massachusetts, in chair bottoms, June 12.

John James Giraud, of Baltimore, in distilling, June 14.

Jacob Sherer and Abraham Killian, of Lancaster, Pennsylvania, a distilling and refining apparatus, June 17.

Thomas W. Jessup, of Fredericktown, Maryland, a fanning mill for cleaning grain, June 18.

Barnabas Langdon and William Mowry, of Washington county, New York, machine for shaving, jointing, and forming the staves and heads of barrels, &c., *(a)*, June 20.

Josiah Noyes, of Herkimer county, New York, a steam stove for roasting, boiling, and baking, June 21.

John George Baxter, of Philadelphia, the family cotton spinning machine, *(b)*, June 22.

Joseph Lyon, of Philadelphia, in preparing and packing quercitron or black oak bark, or other barks, for exportation, July 1.

(a) This is in operation at White-hall, New York.

(b) This has not yet been brought into use. *Editor.*

Jonathan Jessop, of York Town, Pennsylvania, a balance bridge, July 1.

Christian Bergh and Peter Shermerhorn, jun'r., of New York, for spinning and winding rope yarn, July 2.

Charles M'Murtry, of New Marlborough, Massachusetts, in the forge bellows, July 8.

Robert Miller, of Lexington, Kentucky, for breaking hemp and flax, July 13.

Allen Harrington, of Ostego county, New York, in medicine cases, July 16.

John Staples, of Richmond, Virginia, a pendulum steam engine, July 18.

John Hughson, of Clinton county, New York, in kilndrying corn and malt, &c., July 18.

Haziel Smith, of Philadelphia, a machine for chopping meat or any other substance fine, *(a)*, July 19.

Archelaus Putnam, of Philadelphia, an improved accelerating wheel head, July 20.

Leonard Sommer, of Downington, Chester county, Pennsylvania, in horizontal wooden springs for carriages, *(b)*, July 22.

Jacob A. Dana, of Casanovia, Madison county, New York, a flax and hemp break, July 23.

Jonathan Righter, of Downington, Chester county, Pennsylvania, a machine for making sacket and sand shovels, July 23.

Richard Sealy, of Newark, New-Jersey, in the still and condenser, July 25.

William Hollingsworth, of Elkton, Maryland, in tanning, July 30.

Samuel B. Hitchcock and John Bement, of Homer, Cortland county, New York, in boot and shoe making, July 30.

Hawley Emmerson, of Hancock, a wear for catching fish, August 14.

(a) Where meat is cut up on a large scale, this contrivance will greatly diminish labour.

(b) These springs are fixed to the Lancaster stage carriages, and to other stages, and are much approved of. *Editor.*

Jesse Reed, of Kingston, Plymouth county, Massachusetts, in cutting and heading nails, August 14.

William Miller, of Lampeter township, Lancaster county, Pennsylvania, in mill stones, August 15.

Michael Morrison, of Boston, for picking wool, &c. called the wool picker, August 15.

William Gorsuch, of Baltimore, a perpetual lime kiln, August 17.

Bennet Lies, of New York, in the sea motion pump, August 19.

John Sanford, of Sharon, Litchfield county, Connecticut, in varying the motion of a plough, August 20.

Nathaniel Miller and Philip W. Miller, of Franklin, Norfolk county, Massachusetts, in weaving, August 20.

Charles Reynolds, of East Windsor, Connecticut, a mode of propelling carriages by steam, August 21.

Robert Hare, of Philadelphia, a mode of ripening and keeping malt liquor and cider, *(a)*, August 22.

David F. Launey, of Philadelphia, in the electrophorus, August 23.

Abraham Lands, of Georgetown, Columbia District, in the water wheel, August 28.

Theodore Hart, of New York, a double spring angular truss, August 30.

Andrew Henshaw and Nathaniel Harlow, jun'r. of Banger, Hancock county, Massachusetts, in constructing and working pumps for the use of ships, &c., August 30.

(a) The patentee states that malt liquor and cider may be kept on draught in the patent casks as ripe as in bottles, and may be preserved without vent, during transportation, in the warmest weather, by sea or land. They are of various sizes. The smallest holds about as much as three and an half dozen porter bottles, the middle size five and a half dozen, and the largest eleven dozen.

By means of a pipe, annexed by a simple contrivance, the liquor will spontaneously mount into a bar room, and being received in a keg furnished with a vessel for holding ice, may be drawn at pleasure, cool and foaming.

This improvement is now in operation in Philadelphia, in various taverns.

Editor.